



MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

Future demand for tertiary education in New Zealand; 2009 to 2025 and beyond

This report forms part of a series called Learners in tertiary education. Other topics covered by the series are access, pathways, support, participation, retention and qualification completions.

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KEY FINDINGS

There will be increasing demand for formal provider-based tertiary study by domestic students. This will result from:

- The current recession. People will and are choosing to study during this period of economic downturn, rather than remaining unemployed. Unemployment is generally higher for younger or less well educated people, and these characteristics limit their study options. But others are using this time to update their skills for advancement or a change in career when economic conditions improve. Demand for certificate- and diploma-level study is expected to increase the most.
- Initiatives to increase skill levels in New Zealand. For New Zealand's productivity to increase more people are needed with diploma- and bachelors-level qualifications. The levels of work-place literacy and numeracy skills also need to rise. Any initiatives to achieve these ends will necessarily increase the demand for higher-level tertiary education, and in the case of literacy and numeracy skills, for certificate-level study.

The current recession is likely to hinder efforts to raise the number of people with higher-level qualifications. While the recession will lift demand in the short term, the demand for higher-level tertiary education generated by the recession is expected to fall short of what might have been achieved had economic conditions remained buoyant.

- A changing population. Population growth in the 20 to 24 year-old age group will increase demand for bachelors-level study in the short term, and growth in the 40 to 64 year-old age group will increase demand for certificate-level study in the longer term. The increase in the diversity of New Zealand's population will also see demand increase from Māori, Pasifika and Asian peoples. Demand from Europeans will increase only slightly.

Demand for industry training is likely to fall in the short term as unemployment rises during the recession, but this is likely to be tempered by efforts to minimise job losses and encourage industry training. The demand for industry training over the short term is therefore less certain.

In the longer term, and based on population trends alone, demand from people aged 20 to 24 years will fluctuate over the next 30 years. Demand from 25 to 39 year-old people and those aged 40 to 64 years is expected to rise more consistently to levels above those seen in 2008. Demand from 18 to 19 year-olds is expected to decline after 2010 and not increase again until after 2020.

SUMMARY

This study models demand for tertiary education between 2009 and 2025 based on underlying population trends and three scenarios with different assumptions about how rates of participation in tertiary education might vary.

One scenario keeps rates of participation in tertiary education at 2008 levels, so demand is driven solely by changes in population numbers. This no-change scenario provides a baseline with which to compare the others.

The second scenario models the effect of a four-year economic downturn on demand for tertiary education in New Zealand.

The final scenario models the effect of policies that would increase New Zealand's productivity through raising qualification levels and consequently, skill levels. This was also modelled over a four-year period.

After this four-year period, rates of tertiary participation are kept at 2012 levels, and demand is dependent solely on population changes.

Demand for tertiary education was considered by levels of study, age group, sub-sector, type of study (full-time or part-time), gender and industry training. How demand for tertiary education varied by ethnic group was also considered, but only under the assumptions of the no-change scenario.

Demand was modelled using characteristics of the scenarios (whether participation in tertiary education was expected to increase or decrease, and how quickly the change was expected) for particular combinations of age group and level of study. These characteristics, and historical rates of change in participation, determined future participation rates. Potential numbers of tertiary students are calculated from these future participation rates and population projections. Not all of these potential students will become actual students, so demand is reported as an index, based on student numbers relative to 2008.

The results of the models show that just based on population trends, demand for tertiary education is likely to decline for people aged 17 to 18 years, generally decrease for people aged 18 to 19 years, but increase for other age groups. There is unlikely to be much demand for formal tertiary education from people aged over 64 years and this latter group is excluded from most of the analysis.

The effect of the recession is expected to increase demand for certificate- and diploma-level study, particularly from people aged 17 to 39 years. Demand across all levels of study from people aged 40 to 64 is expected to be largely unaffected by the recession.

For certificate-level study, the effect of the recession is to increase demand from younger age groups. This is opposite to what would be expected had the recession not occurred. This has implications for efforts aimed at improving New Zealand's productivity, unless certificate-level study is used as a stepping-stone to higher-level study.

For diploma-level study, the recession is also expected to increase demand, but to levels lower than might have been expected from initiatives specifically designed to increase demand for this level of study.

Demand for bachelors-level study is expected to increase from people aged 20 to 24 years during the recession, but modelling shows the effect of the recession is only marginal; most of the increase in demand comes about from population increases. However, initiatives to specifically increase the number of people with a bachelors-level qualification would have increased demand even further.

Demand for postgraduate study is likely to increase from the 20 to 24 year-olds during the recession. Other age groups are less likely to be affected.

Differences in participation in tertiary education by male and female students are not likely to be changed by trends in the gender balance of the population over the coming years. Our modelling shows essentially equal changes in demand for tertiary education by gender over our forecast and projection horizons. Assuming this demand is met equally, the current imbalances in enrolments between men and women are likely to persist.

Fluctuations in the relative sizes of the 18 to 19 and 20 to 24 year age groups over the next 25 years will result in periods of increasing, then falling demand for tertiary education. This contrasts with the more predictable trends of the 25 to 39 and 40 to 64 year age groups. Here, the population levels in the longer-term increase, and then stay at levels higher than those seen in the recent past.

The number of Māori, Pasifika and Asian peoples will increase over the next few decades. This will increase the underlying level of demand for tertiary education from these groups. Proportionally, older age groups are expected to increase the most across all ethnic groups.

There are distinct differences in demand for tertiary education by level of study between the ethnic groups by age. For bachelors-level study, Pasifika show increasing demand across all age groups, while for Asians, it is the 40 to 64 year-old age group that shows the greatest increase in demand. Europeans show little change in demand across all age groups for bachelors-level study.

The increasing demand from Māori, Pasifika and Asian ethnic groups will likely result in changes to the way providers deliver and support tertiary education and their students, and in the ethnic composition of their academic staff.

Changes in demand for tertiary education will affect providers differently. Universities, with their greater focus on bachelors-level study, will generally see a lower level of increase in demand than other providers. However, any provider offering certificate- or diploma-level courses will see increased demand over the next few years as people choose education at these levels during the economic downturn. However, measures implemented to counteract the effects of the recession will make determining demand uncertain. Wānanga and private training establishments show the greatest uncertainty in changes in demand.

Increasing unemployment, and the concomitant decrease in the size of the workforce, will most likely result in fewer people involved in industry training. The size of the decrease will depend on the depth and extent of the recession and on the success of measures aimed to minimise unemployment and encourage industry training. These and other factors make the outcomes for industry training also quite uncertain.

1 INTRODUCTION

“Demographers can no more be held responsible for inaccuracy in forecasting populations 20 years ahead than geologists, meteorologists, or economists when they fail to announce earthquakes, cold winters, or depressions 20 years ahead. What we can be held responsible for is warning one another and our public what the error of our estimates is likely to be”, Nathan Keyfitz.¹

Human capital is crucial to the success of modern economies (Keeley 2007). Human capital—the knowledge, skills, competencies and attributes that allow people to contribute to their personal and social well being—is strongly dependent on education. Moreover, having a tertiary education system that is well resourced and in tune with the requirements and aspirations of the populace, and able to respond to the demand for it, will help ensure that a country maximises its store of human capital.

This study models the demand for tertiary education in New Zealand up to 2025. It is based on usually resident population projections produced by Statistics New Zealand, and on historical New Zealand tertiary education participation rates. Broadly, it updates the study of long-term demographic trends done by McClelland (2006). Overall trends in demand for tertiary education out to 2060 are also considered but these are only based on population trends.

While the underlying statistic produced by the modelling in this study is the potential number of tertiary students, it does not follow that this number of students will be, or possibly should be, attending tertiary education. Rather, the study provides an indication of the number that could *possibly* be attending; it is in fact the *potential* demand for tertiary education. Numerous factors determine how many people actually receive a tertiary education, not least of which is government’s decision on how many student places it is prepared to fund in any one year. This study aims to help prepare the providers of tertiary education, government policy makers and others, to optimise this number both to fulfil individuals’ potential, and to turn that potential into a benefit for the country as a whole.

The demand for tertiary education to 2025 is studied from the point of view of a number of demographic variables—age group, ethnic group and gender are considered against level of study, type of study (full- or part-time) and tertiary education provider. Demand for industry training is also considered. The study focuses only on New Zealand domestic students and limits (unless otherwise specified) the population to people most likely to study at tertiary level, those between 15 and 64 years of age.

Three scenarios are used to model the behaviour of participation:

- a population-driven scenario, which keeps the rates at which the population participates in tertiary education at 2008 levels, such that changes in tertiary demand are solely driven by changes in the size of the New Zealand population;
- a scenario that models the effect of policies that would increase New Zealand’s productivity through raising qualification levels and consequently, skill levels; and
- a scenario that models the effect of the economic downturn on demand for tertiary education in New Zealand.

In each scenario, the likely impact on the participation rates in tertiary education is characterised for each combination of age group and level of study, and for the impact on industry training.

¹ Quoted in Lutz and Goldstein (2004), page 1.

The duration of the impact of the scenarios on participation rates has been set at four years. In the four-year period 2008 to 2012, we alter participation rates under the assumptions of a particular scenario. We have called the model results during this period ‘forecasts’. The length of time into the future we are working with is short enough for us to be moderately confident of the trends under each scenario, and the population projections are more accurate in the early years of the projection horizon (Statistics New Zealand 2008a).

After this four-year period, after 2012, participation rates are held constant at the level reached in 2012. The model results after 2012 are labelled ‘projections’.

The decision to use four years was based on a likely length of the economic downturn in New Zealand of two years, with a two-year recovery period. At the time of writing this report in early 2009 there was some consensus amongst commentators and pundits around the two-year figure (Leung-Wai, Sanderson & Nana 2008). Supporting this decision is the forecast for unemployment over the next few years. Unemployment is arguably the more important factor in determining people’s disposition to tertiary study during a recession (Varghese 2001, Baynes et al 2002, New Zealand Herald 2009 and The Guardian 2009²) and this is forecast to rise over the next two years and then recover to levels approaching the pre-economic downturn (New Zealand Treasury 2008a). How the model results might change if the recession is of different length is considered in section 6.

The three scenarios provide an indication of the likely variation in tertiary demand. Of course, the demand for tertiary education will be the result of some complex combination of policy implementation, funding strategies, labour market factors, technology factors, population pressures and the effects of the recession, amongst others. While no attempt has been made to model the interaction of the three scenarios, or explicitly include other factors in the model, the range of values modelled by the scenarios give a heuristic insight into the possible variation in tertiary demand.

This report has the following structure.

- Section 2 describes the scenarios that underpin the study’s model.
- Section 3 of the report deals with changes in New Zealand’s population out to 2025.
- Section 4 presents the results of the modelling. Separate sections include results for levels of study, age group, sub-sector, type of study, gender, industry training, and ethnic groups. Within ethnic groups the variables gender, age group, level of study and industry training are considered.
- Section 5 provides some general information about trends in the population projections and their impact on the demand for tertiary education out to 2060.
- Section 6 shows the results of varying the length of the economic downturn in the recession scenario in the model
- Section 7 is a discussion of the results and generalises about uncertainty, the effects of a changing population, and comments briefly on other studies modelling demand for tertiary education.
- Section 8 describes the data, methods and limitations of the study.

² The rapidly changing economic circumstances necessitated using sources of information not normally associated with analytical work. Peer-reviewed articles and government reports were almost invariably out-of-date in respect of the developing events of the 2008 New Zealand recession.

2 SCENARIOS

McClelland (2006), in his study on how population trends affect the demand for tertiary education, used constant participation rates to calculate likely demand. As this present study was beginning, the world's economic systems suffered a major downturn, and it became apparent that participation rates were not likely to stay constant even under the most optimistic assumptions. Consequently, the approach taken in this study was to include two scenarios in which tertiary participation rates were allowed to vary, contrasted with one in which they were kept constant. The scenario, where participation rates are held constant, provides a baseline of tertiary demand driven entirely by population change. The second scenario envisages success in improving productivity through having a population with higher-level qualifications, especially in trade, technical and professional areas³. The third scenario assumes a reasonably severe economic downturn with an increase in the unemployment rate. The technical details of these scenarios are provided in section 8.3.

All scenarios assume there are sufficient numbers of qualified school leavers available to take up tertiary study. Recent history shows that each year, a greater proportion of school leavers are gaining university entrance qualifications, or qualifications that entitle people to study at diploma or certificate level (Ministry of Education 2008c).

The recession might tend to increase school retention rates. However, staying longer at school may lead to higher qualification levels of eventual school leavers, improving the likelihood that those people will choose tertiary education as their next activity. Smart (forthcoming) shows that the changes in the number of bachelor-level students lags about one year behind changes in school leavers. In this study, this lag has not been included in the modelling.

It is also assumed that students will continue to be able to afford tertiary study. This assumes the government will continue to fund tertiary education through loans and allowances.

A further assumption is that participation rates are able to increase (and decrease) in New Zealand, and that a 'universal' (Vincent-Lancrin 2008) or saturation participation rate has not yet been reached.

2.1 Length of recession

At the time of writing, it was unclear how long the recession would last in New Zealand. There was evidence that the downturn might be protracted in the United States of America and Europe, but commentators here were suggesting that it would only last a couple of years, with a slow recovery after that. How long then to model the effect of the recession in this study?

The approach taken in the recession scenario was to assume a two-year economic downturn, with a further two-year recovery period. The characteristics of the scenario (direction and strength of change in participation rates) were applied for two years, and then reversed for two years. This reversal was done to reflect ameliorating economic conditions during a recovery. One would expect that during the recovery there would still be some, albeit diminishing, impact of the effects of the recession.

The four-year period was also used in the improving productivity scenario, providing symmetry between the scenarios used in the modelling.

³ Refer to Ministry of Education (2007a) for a discussion of the strategies behind these outcomes.

What if the recession lasts longer? Section 6 compares the recession scenario using 4, 6 and 8 year recession periods. This provides some guidance if the effects of the recession in New Zealand are longer than 4 years, and indicates how sensitive the results for level of study and age group are to the length of the economic downturn used in the model.

2.2 No-change scenario

In this scenario, participation rates are essentially kept constant at 2008 levels. They are adjusted slightly in 2009 and 2010 to prevent sudden discontinuities in rapidly changing rates, and then kept constant through the remainder of the projection period. Therefore, changes in demand result solely from changes in population size. This scenario provides a baseline from which to compare the effects of the other two scenarios and it enables comparisons to be made with previous studies.

2.3 Improving productivity scenario

Successive governments have argued that for New Zealand to improve its productivity it requires more people to have higher-level qualifications. Improving skills has been identified as one of several necessary conditions for productivity to increase (New Zealand Treasury 2008b, 2008c), while Rao, Tang and Wang (2002) showed that skill level, as measured by having a university degree, was strongly correlated with a firm's productivity. This scenario therefore models an 'ideal' outcome that aims to increase the number of people with higher-level qualifications. While an economic downturn will have an impact on this scenario, any interactions are not explored in this study. The details of the improving productivity scenario can be found in section 8.3 and Table 4.

In broad terms, this scenario envisages improved literacy and numeracy in the population and an increase in study at higher qualification levels, especially among young adults. Specifically, there will be a fall in demand for level 1 to 3 certificate courses for people aged under 24 years. There is a concomitant increase in participation for people aged 18 to 24 years in level 4 certificates, diplomas and bachelors-level courses. These are a consequence of the focus on this age group studying at higher than certificate level.

People aged 15 to 17 years are expected to have a lower participation rate because of favourable labour market conditions. With the ready availability of jobs a certain proportion of young people will choose employment over further study. A further group will remain in secondary school, assisted by government efforts to improve their school leaving qualifications.

People aged 18 to 24 years will also show increasing participation in postgraduate study, mostly as a consequence of more people undertaking bachelors-level study, although it is expected this will occur mostly for the older (20 to 24 years) members of this group.

For people aged 25 to 39 years the scenario envisages no effect on participation at certificate-level and in postgraduate study, and small increases in diploma and bachelors-level study. This is primarily because the benefit to people undertaking higher education diminishes with age, but there will be some impetus for study at this level because of the policy to encourage participation in higher-level tertiary education.

For people aged 40 to 64 years, the scenario envisages some increased participation in certificate and diploma-level study, with no change at bachelors and postgraduate level. This is because this group is most likely to study recreationally, although that is not to suggest that some people in this age group do not study for labour market reasons, for example, raising their skills and knowledge to achieve promotions, or move to new jobs.

Across all levels of study, total participation is expected to decline for those people aged 15 to 17 years, and increase for the other age groups.

Industry training participation is envisaged to increase across all age groups. This would be in response to initiatives to increase literacy and numeracy skills (Ministry of Education 2008b), and the assumption of increased (or at least not falling) employment will also increase levels of industry training.

2.4 Recession scenario

It is generally expected that participation in tertiary education will increase when economic conditions deteriorate (Vargese 2001, Leung-Wai, Sanderson and Nana 2008), particularly in countries with subsidised education as in New Zealand. This was already occurring at the time of undertaking this study (New Zealand Herald 2009, Radio New Zealand 2009). A decline in the value of a local currency also contributes to students studying overseas to return home to complete (or start) their studies (Vargese 2001). The primary driver of this is unemployment and reduced labour market opportunities (Baynes et al 2002). Generally it is the younger-aged people who tend to experience higher unemployment rates during a recession and those with no or low-level qualifications have higher unemployment rates for any given age. Again, this was already occurring in New Zealand at the time of writing (Department of Labour 2009). This is reinforced by the desire to study shorter-course programmes that can be finished in time for the hiring surge that accompanies an economic recovery (Usher and Dunn 2009).

The recession scenario envisages a marked increase in participation in certificate and diploma-level study for people aged 24 years and under. This will occur to a lesser extent for people aged 25 to 39 years, and for those aged 40 to 64 years there is no change to participation⁴. This pattern of participation follows directly from the pattern of unemployment across age groups during a recession and the type of study available to them. It may also be assisted by government initiatives to encourage employees to study (for example, the government is encouraging some industries to adopt a 9-day working fortnight, with the extra day being used for study).

For bachelor-level study, this scenario envisages no change for people aged 15 to 17 years and those aged 40 to 64 years, but to increase slightly for all other age groups. This would occur because of the limited labour market opportunities. Instead of taking a year off to work after completing school qualifications, school leavers will enter study. Others with university entry qualifications will enter study to increase their future job prospects. People slightly older and already in the workforce will choose study to increase their skills or take the opportunity of the recession to pursue career changes. These patterns were already emerging as this report was being finalised (New Zealand Education Review 2009c).

For postgraduate study, we envisage a slight increase in demand from people aged 20 to 24 years, essentially being those who finish their undergraduate studies and decide to stay on and complete a masters or honours degree. Again, people opt for short courses that can be completed quickly (Usher and Dunn 2009). Anecdotal evidence of higher enrolments in 2009 for some postgraduate courses supports this (New Zealand Herald 2009). For other age groups we envisage no change in demand for postgraduate study.

⁴ Participation in certificate- and diploma-level study by the 40 to 64 year-old age group might decline as opportunity costs of recreational study rise. In our scenario, we have been conservative and kept participation rates constant. If the recession were longer, this might need to change.

Across all levels of study, participation is envisaged to increase moderately for people under 25 years, and increase slightly for those aged 25 to 39, and not affect those people aged 40 to 64 years.

Industry training, being dependent on employment, is envisaged to fall markedly for those most affected by rising unemployment (under-25-year-olds), fall somewhat less for those aged 25 to 39 years, and fall a little for those aged 40 to 64 years. Again, recent reports in New Zealand show falling numbers of industry trainees in some areas. Building and construction trainee numbers were reported to be falling by 100 apprentices a month (in mid February 2009) because of layoffs, and some polytechnics had also noted decreases in their managed apprenticeships (New Zealand Education Review 2009a).

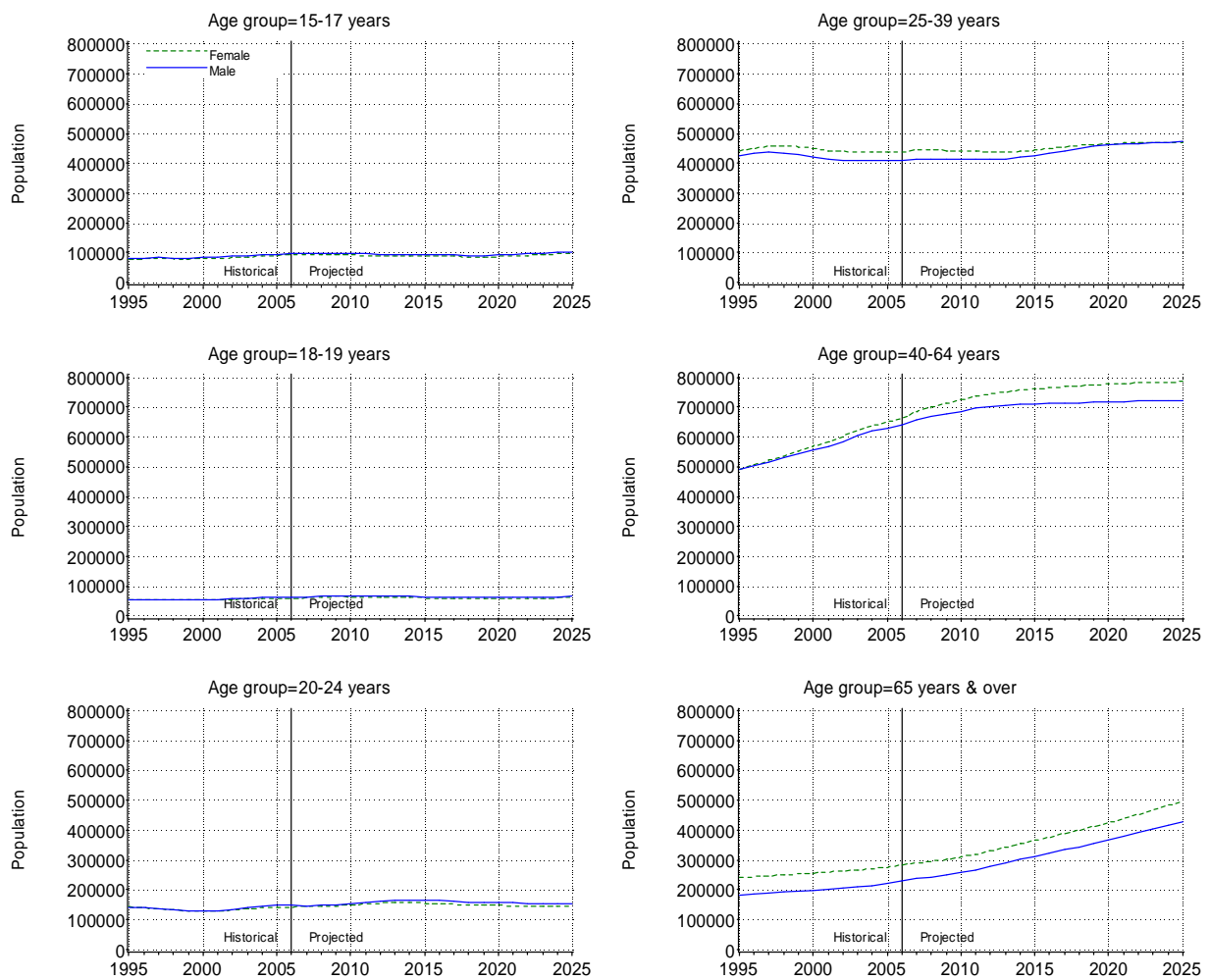
Further details of this scenario can be found in section 8.3 and Table 5.

3 POPULATION TRENDS TO 2025

New Zealand’s population is getting older overall, and more ethnically diverse. A comprehensive review of how the New Zealand population will change over the next few decades can be found on the Statistics New Zealand website (Statistics New Zealand 2008b).

Figure 1 shows the population trends for males and females by age group for those aged 15 years and over. The ageing of the population is clearly seen. This feature of the population is common to many other countries, and results from increasing levels of low fertility and reducing mortality (Statistics New Zealand 2008b).

Figure 1
Estimates and projections for the New Zealand population by age group and gender



Source: Statistics New Zealand population estimates and projections (2006 based).

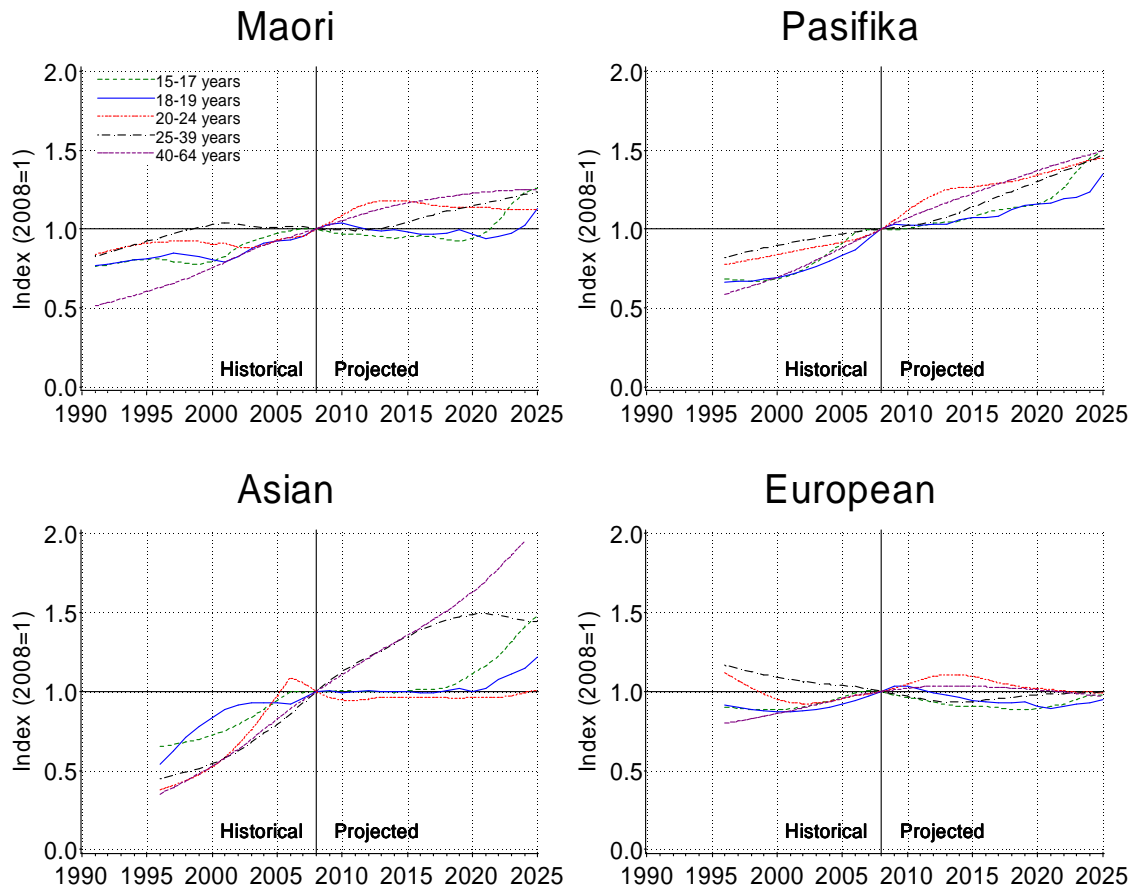
In the case of the Asian population, the growth is mainly driven by net migration gains. In the case of the Pasifika and Māori populations, the growth is mainly due to higher fertility rates combined with a youthful age structure (Statistics New Zealand 2008b)⁵.

⁵ In this study, only the highest level of ethnic classification is used, namely European, Māori, Pasifika and Asian. The other category at this level, Middle Eastern/Latin American/African, is excluded. Total response data is used, so a person can be counted in more than one ethnic group. The section on data, methods and limitations describes the population data in more detail.

In Figure 1 differences between the genders are most prominent in people 40 years and over, but some differences can also be seen in the 25 to 39 years age group.

Figure 2 shows population data by ethnic group and age group. The population numbers are plotted as an index relative to 2008⁶. The reference year of 2008 has been chosen to align the population data with the model results in this report. This approach entails using two years of population projections as ‘actual’ or historical data. The errors associated with doing this will be small, and this method is preferred to beginning the forecasts in 2006.

Figure 2
Population trends and projections by ethnic group and age group



Historical population estimates for the European, Asian and Pasifika ethnic groups was only available in census years from 1996. Source: Statistics New Zealand population estimates and projections (2006-based).

These graphs highlight the other dominant trend in the New Zealand population; that Māori, Pasifika and Asian ethnic populations will increase at a faster rate than the European population. The European ethnic group however will remain the largest group (see Table 1).

The graphs in Figure 2 also clearly show trends within individual age groups. Pasifika show the most consistent trends, while Māori and Asian ethnic groups in particular show rises and falls in some age groups, while for others there are long periods of little change followed by increases.

⁶ This report uses this method of presenting data extensively, emphasising relative changes in level as opposed to changes in numbers.

Table 1

Composition of the New Zealand population 15 years and over by ethnic group

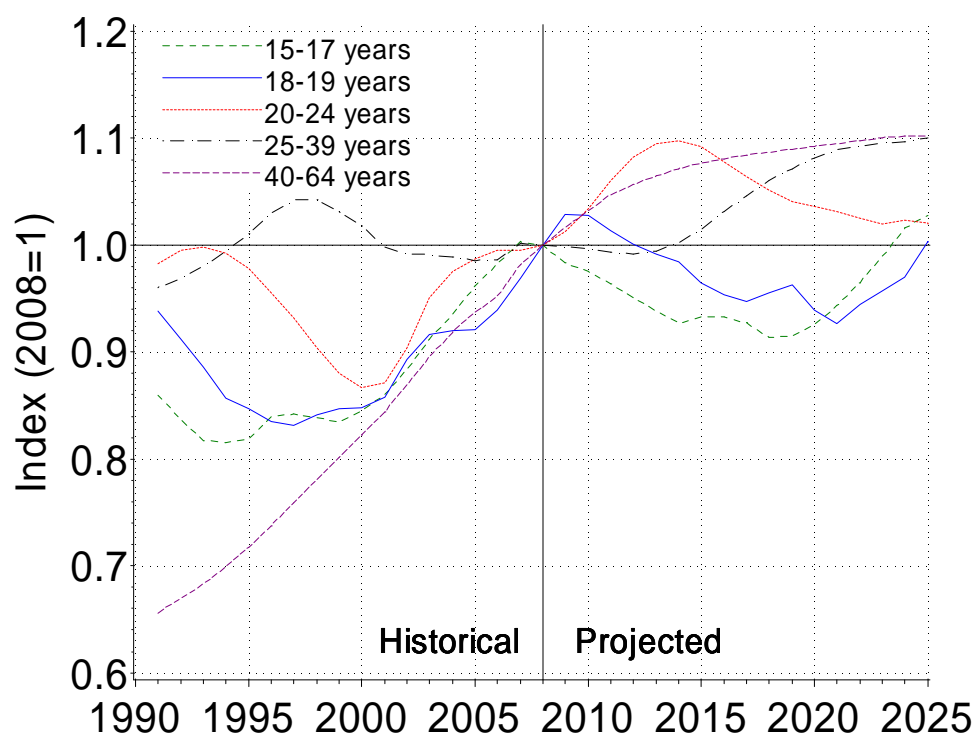
Ethnic group	2000	2005	2010	2015	2020	2025
European	81%	79%	76%	74%	73%	71%
Māori	12%	12%	13%	13%	13%	14%
Pasifika	5%	6%	6%	7%	7%	8%
Asian	6%	9%	11%	12%	14%	15%
Total	100%	100%	100%	100%	100%	100%

People can belong to more than one ethnic group, so individual percentages may not add to 100 percent.

While the study only uses New Zealand domestic students in the model calculations, the population figures will include those people who come to New Zealand to study. This applies particularly to the Asian ethnic group. As can be seen on the graph for the Asian population in Figure 2, the jump in Asian people aged 20 to 24 years in 2006 corresponds to the high numbers of foreign fee-paying students in New Zealand at that time. While this historical peak will not affect the model calculations, numbers of Asian students counted in the population projections will affect the projected demand for tertiary study by the Asian population.

Figure 3

Trends and projections for the New Zealand population by age group



Source: Statistics New Zealand population estimates and projections (2006-based).

Figure 3 shows the trends for the New Zealand population by age group. Except for those aged 40 to 64 years, each cohort shows fluctuating levels over the 17-year projection period that will be reflected in varying demands for tertiary education. These projected trends are repeated in Table 2 for selected years.

The decline in the 18 to 19 year age group after 2012 will mostly affect bachelors-level study, since this age group is almost solely represented in this level of study (Ministry of Education 2008b). The declining level of demand in this age group resulting from demographic trends seen

from 2012 to 2021 will go some way to offset the increasing demand in bachelors-level study in the 25 to 39 year age group (after 2013) and from those aged 40 to 64 years.

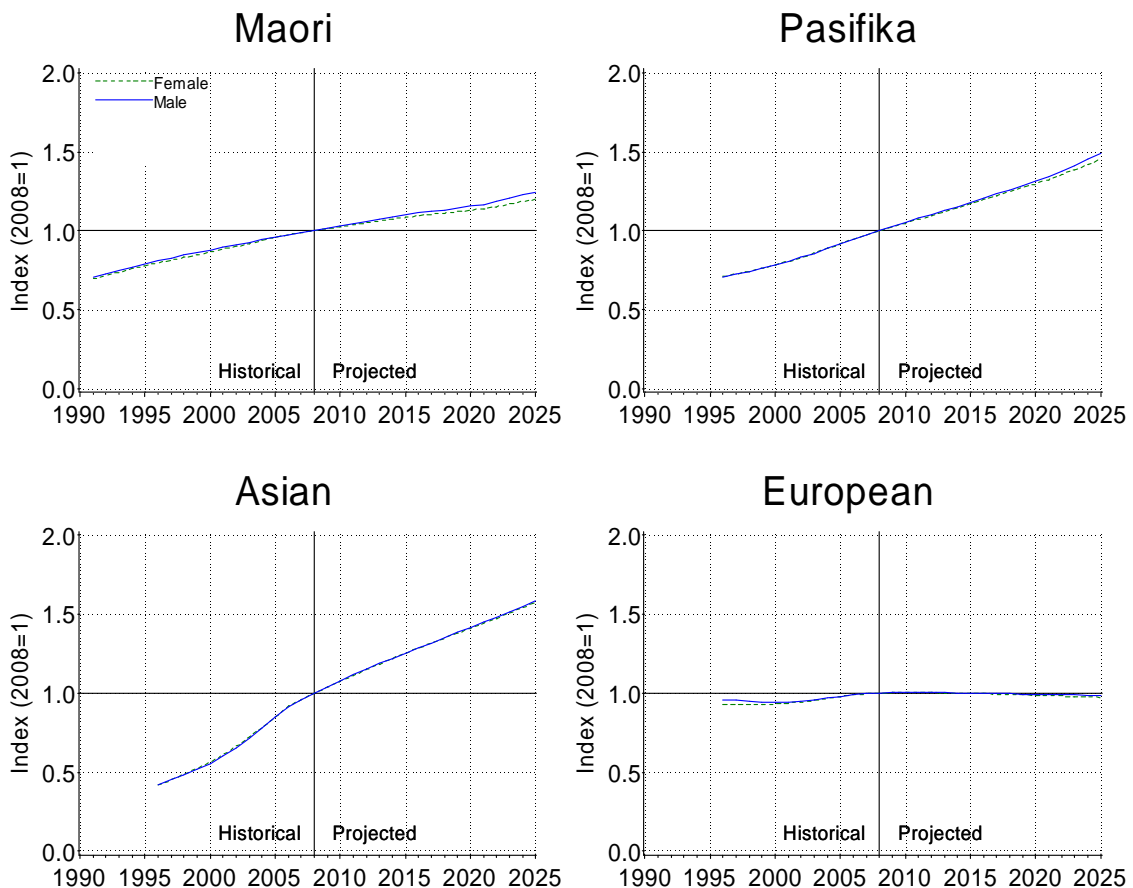
Table 2
Trends in the New Zealand population by age group indexed to 2008

Age group	2008	2010	2012	2014	2016	2018	2020	2022	2024
15 to 17 years	1.00	0.98	0.95	0.93	0.93	0.91	0.93	0.96	1.02
18 to 19 years	1.00	1.03	1.00	0.98	0.95	0.96	0.94	0.94	0.97
20 to 24 years	1.00	1.03	1.08	1.10	1.08	1.05	1.04	1.03	1.02
25 to 39 years	1.00	1.00	0.99	1.00	1.03	1.06	1.08	1.09	1.10
40 to 64 years	1.00	1.03	1.06	1.07	1.08	1.09	1.09	1.10	1.10

Figures are the proportion of the population for an age group in any one year relative to 2008. A figure of 1.10 indicates the population of that age in that year is expected to be 10 percent higher than it was in 2008.

Figure 4 shows population trends by ethnic group and gender. There is little difference between the trajectories by gender so these graphs also serve to show the overall population trends. They also show the relative increases in population size within ethnic groups.

Figure 4
Population trends and projections by ethnic group and gender



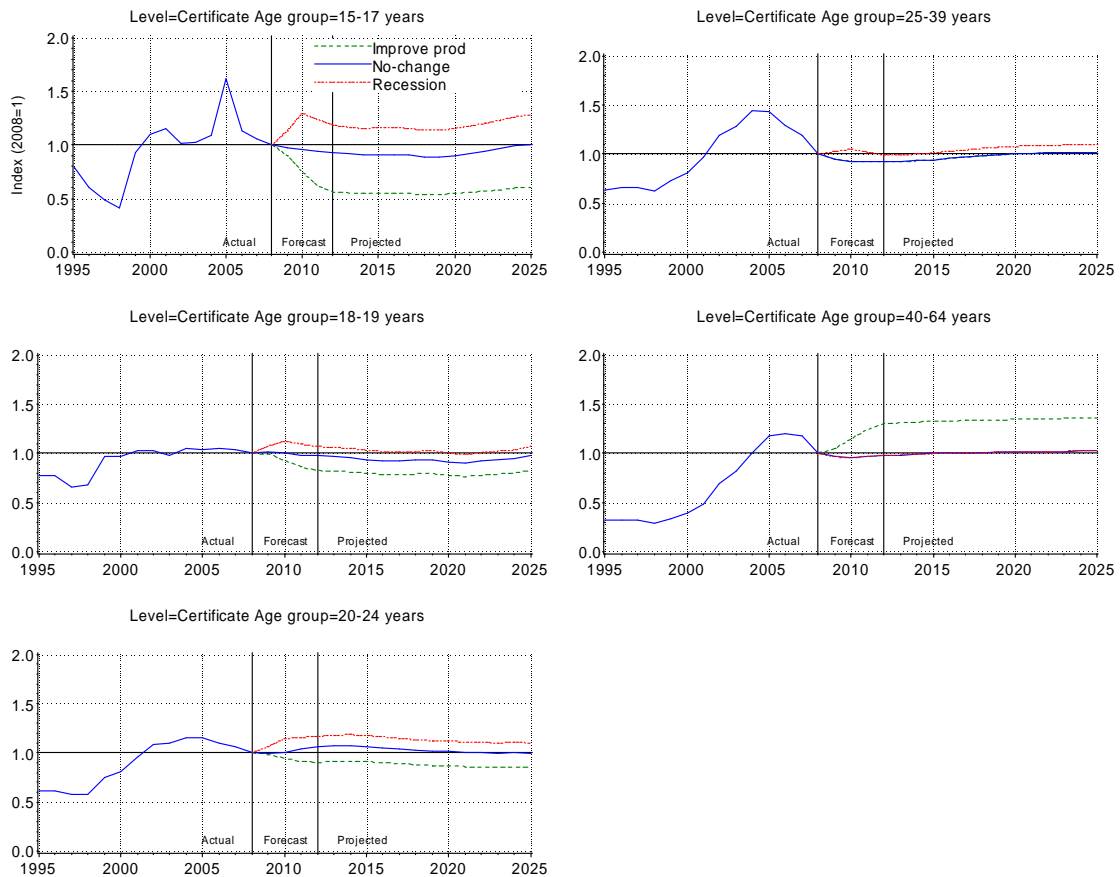
4 DEMAND FOR TERTIARY EDUCATION

4.1 Certificate-level study

The demand for level 1 to 3 certificate-level study (referred to simply as certificate-level study) has shown much volatility over the past few years. Student numbers increased rapidly from around 1998, peaking in 2005, and then declined equally rapidly. The rise was primarily due to wānanga, then institutes of technology and polytechnics, offering low or zero fee courses. The trend was reversed as a result of government policy designed to improve the quality and relevance of provision at this level (Ministry of Education 2007b, p92), and because of the prevailing labour market conditions which saw people choose work over study (Ministry of Education 2008b, p104). With the introduction of tertiary education organisation investment plans in 2008, and the consequent greater central influence over provider strategies, it is likely that participation in level 1 to 3 certificates will decline further. Counteracting this trend though are the deteriorating employment conditions that will tend to increase enrolments in lower-level certificates by those without qualifications or with only lower-level qualifications.

The graphs for demand for certificate-level study are seen in Figure 5. Changes in demand (based on actual number of enrolments) can be seen on the left hand side of each graph. The rapid increase in demand observed between 2000 and 2005 is evident (for some age groups), as is the equally rapid decline to 2008.

Figure 5
Demand for study of level 1 to 3 certificates by age group



This historical volatility in demand for certificate-level study indicates this part of the tertiary education system is able to react quickly, whether from government-imposed reforms, or

through economic drivers like a recession. That this is the case is not surprising; entry requirements to this level of study are low, making them available to a diverse pool of people, and the short courses that characterise certificate-level study can be completed within a year or part thereof, even if studying part-time. This, combined with the diverse fields of interest covered by the qualifications, makes them attractive to prospective students.

After 2012, the trajectories for the three scenarios run parallel, as population change is the sole determinant of demand in the model. The graphs show how different patterns of demand are produced depending on the interplay of the assumptions of the scenarios, historical rates of change in participation, and projected population change.

Forecast and projected results for the youngest and oldest age groups show the highest degree of uncertainty in outcome. The modelling suggest that the recession will mostly affect demand from the 15 to 17 year-olds and those aged 20 to 24 years, leaving demand by people aged 40 to 64 years largely unaffected. The impact of the improving productivity scenario falls mostly on the under 20 year-olds and on those aged 40 to 64 years, but in opposite directions.

Overall, the effect of the recession will be to increase demand for these certificate-level courses, over what would have been expected through population change alone. Only the 40 to 64 year age group are not affected when compared to the no-change scenario, but here, the demand under the recession scenario is lower than that expected under the improving productivity scenario. This shows that the recession may have a negative impact on the demand by this age group for certificate-level study compared to what may have been achieved in a better economic climate.

It is expected that actual demand will track somewhere between the highest and lowest trajectories in each graph. The greater the difference between the modelled results of the scenarios, the more uncertain the outcome is likely to be.

4.2 Diploma-level study (including level 4 certificates)

The pattern of participation in diploma-level study has changed in recent years (Ministry of Education 2008b). Between 1994 and 1998 participation fell, while it increased rapidly from 2001 to about 2005. Since then enrolments have remained relatively static. This overall pattern however masks differences between age groups and sub-sectors (see Section 4.5).

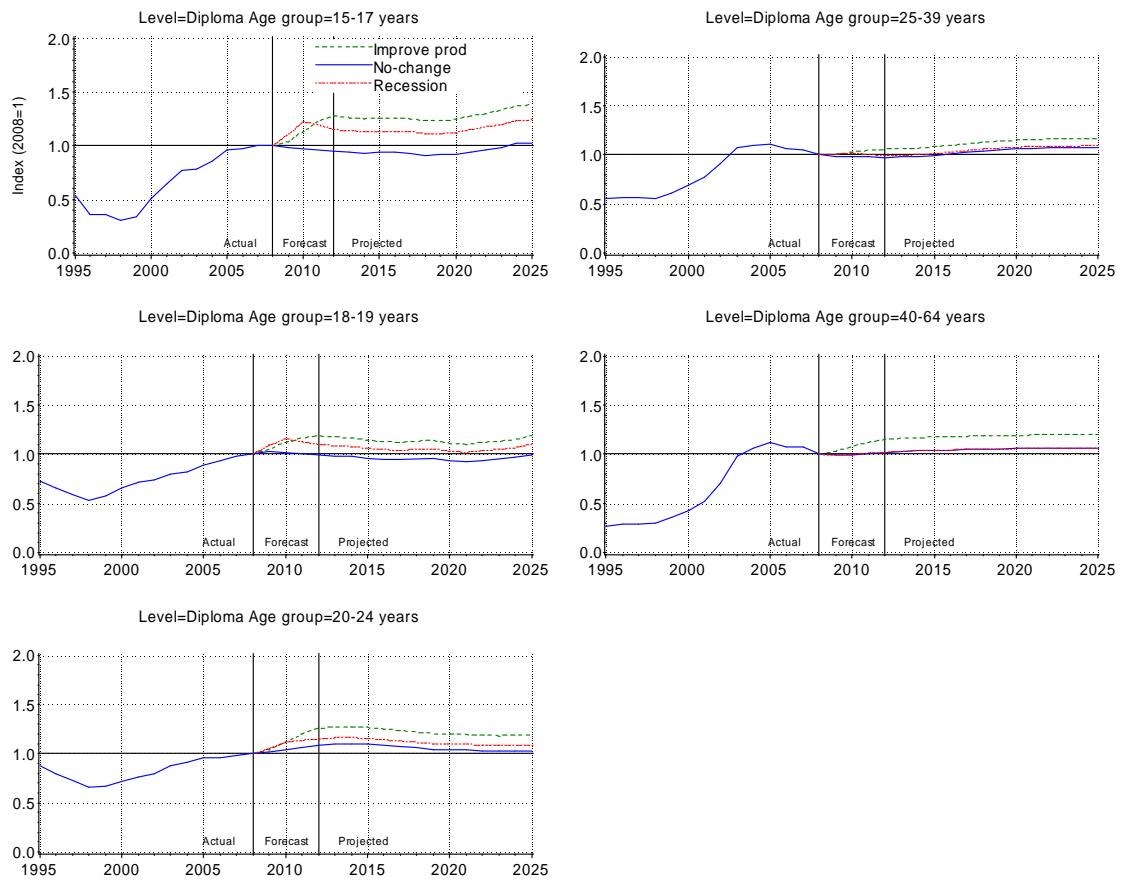
Figure 6 shows the model results for level 4 certificates and diploma-level study by age group. The graphs show that the sharp rise and fall seen in levels 1 to 3 certificate-level study did not occur for diplomas. For those 24 years and under there has been a steady increase in enrolments up to 2008 over the past several years, but the level of demand by those older has risen slightly and fallen again in recent years.

Under the government's review of the quality and relevance of tertiary study, level 4 certificates and diploma-level qualifications are preferred over level 1 to 3 certificates. The improving productivity scenario therefore envisages small increases in participation for people aged 25 years and over, and moderate increases in participation for those under 25 years.

In the recession scenario, the demand characteristics for diplomas are envisaged to be the same as for certificate-level study, with large increases in participation for those people aged under 25 years, moderate increases for those 25 to 39 years and no change for those aged 40 to 64 years. Those with low or no tertiary qualifications wishing to improve their job prospects will target these two levels of study (certificate and diploma level). The trajectories of the recession scenario for certificate and diploma-level study are much the same. Any differences are because

the rates of participation in 2008 at the start of the forecast period vary among the different levels of study and age groups.

Figure 6
Demand for study of level 4 certificates and level 5 to 7 diplomas by age group



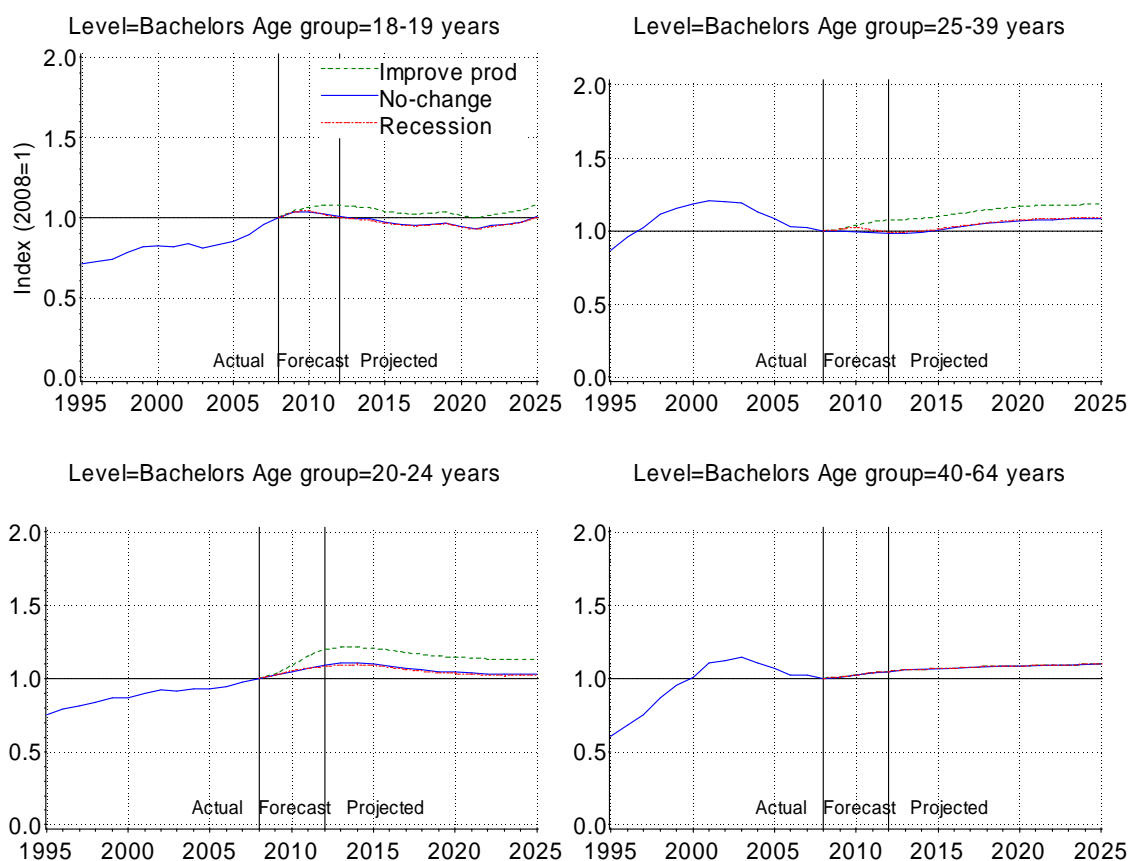
Overall, the modelling shows that the effects of the recession will dampen demand below that which would have been expected from the improving productivity scenario. However, the recession scenario trajectory is higher than what might have been expected from demographic change alone. Only in the 15 to 17 year-old group does the recession scenario show an increase in demand. However, this is a small group, and the difference in the scenario trajectories suggests the outcome is uncertain. And for the 18 to 19 and 20 to 24 age groups the recession scenario does increase demand up to 2010. The eventual outcome in all cases will depend how the opposing trends in the scenarios unfold.

4.3 Bachelors-level study

Enrolments in bachelors-level study have been increasing since 1994 for those younger than 24 years. Few 15 to 17 year-olds study at this level. For people aged 25 years and over enrolments increased from 1994 to 2002, and have declined since then. Most enrolments occur in universities, with four in every five students studying bachelors in this provider type (Ministry of Education 2008b). These trends can be seen in Figure 7 up to 2008.

The historically lower level of volatility in demand for bachelors-level study results in the forecasts exhibiting fewer differences between the scenarios in the forecast period. Consequently, the trajectories of the projections after 2012 are also similar, particularly when compared to lower-level qualifications (compare Figure 7 with Figure 5 and Figure 6).

Figure 7
Demand for bachelors-level study by age group



The relatively steady historical trends produce an interesting result. Our recession scenario envisages increasing demand for bachelors-level study for people aged 18 to 39. But our modelled results indicate the recession trajectory is barely different than what would have been expected from population change alone. This suggests that any increase in demand for this level of study, particularly in the 20 to 24 year age group, is more likely to be driven by underlying population increases, rather than by any behavioural changes caused by higher unemployment.

Overall, apart from the people aged 40 to 64 years, the recession is likely to dampen demand for bachelors-level study when compared to what may have been expected under the improving productivity scenario.

4.4 Postgraduate study

Enrolments in postgraduate study have increased since 1994. For people aged 20 to 24 years enrolments fluctuated somewhat between 1994 and 2003 but since then they have increased. These trends are shown in Figure 8. Postgraduate study is confined primarily to those aged over 20 years, so the results for the younger age groups are not shown.

This level of study is envisaged to be the most unlikely to change, either from the implementation of policy to improve qualification levels or the recession. It is expected that under the improving productivity scenario there will be a small increase in participation by 20 to 24 year-olds as a result of their increased participation at bachelors-level study, while under the recession scenario no change is expected for any age group.

These expectations are graphed in Figure 8 and all age groups show relatively minor changes in demand. All three scenarios track along the same trajectory for people aged 25 years and over, and for the 20 to 24 years age group the improving productivity scenario shows a slight increase in demand compared to the other two scenarios. Across all scenarios, demand is expected to increase over time for people aged 40 to 64 years. For people aged 25 to 39 years demand will stay relatively flat at first and then increase around 2014. For 20 to 24 year-olds demand is expected to increase to about 2013 and then decline.

Figure 8
Demand for postgraduate-level study by age group

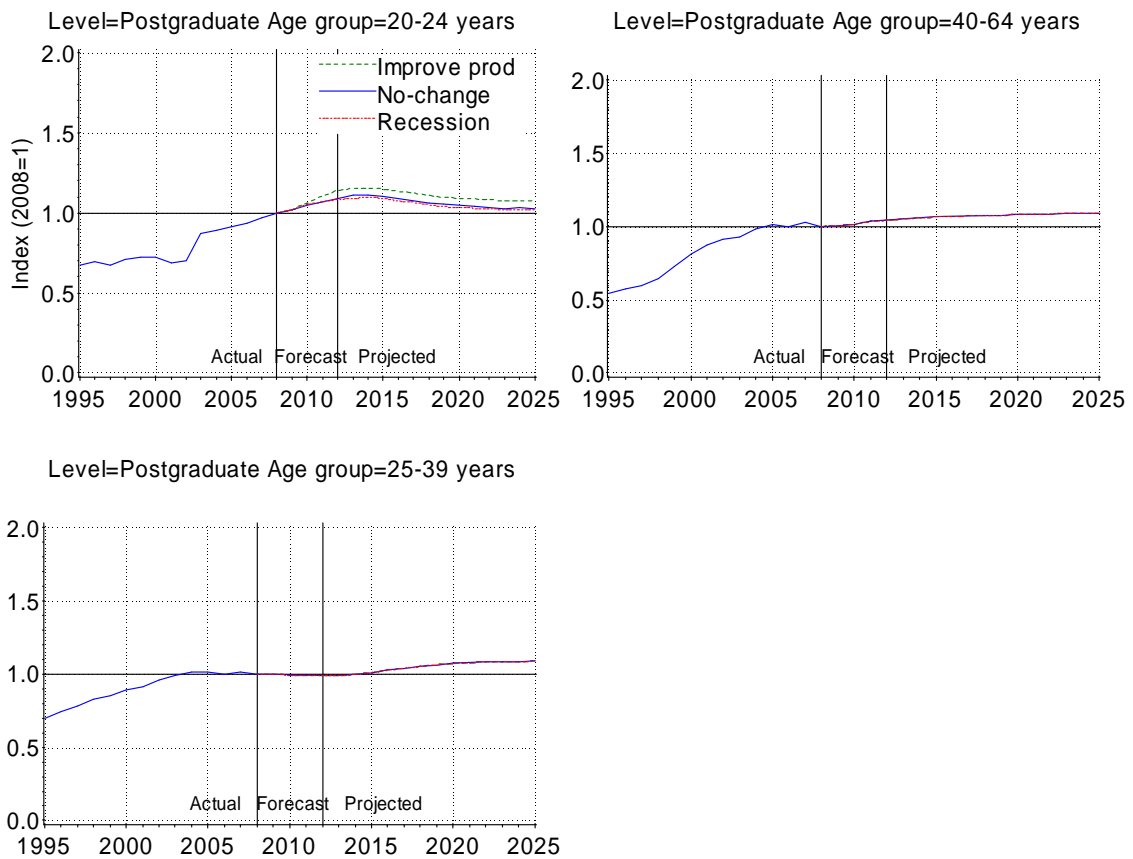
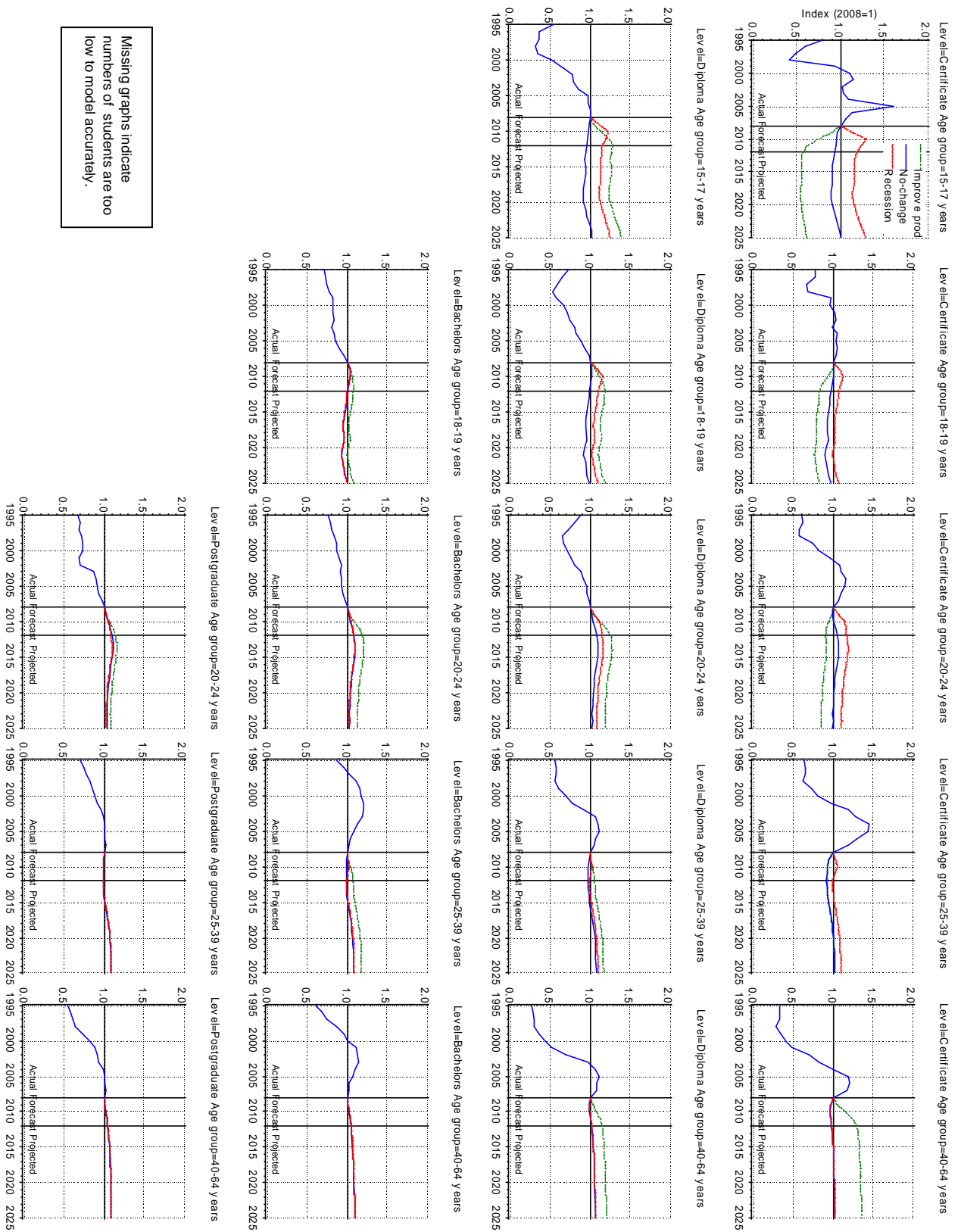


Figure 9 presents the results for Figure 5 to Figure 8 for all levels of study and age groups in the one graphic, facilitating comparison both within and between these two variables. These graphs provide a clear picture of the underlying patterns and trends.

Figure 9
Demand for tertiary education by level of study and age group



4.5 Level of study and sub-sector

Providers of tertiary education in New Zealand fall into a number of sub-sectors: universities, institutes of technology and polytechnics, wānanga (Māori centres of tertiary learning) and private training establishments. There is also considerable formal training activity in the workplace, which is considered in section 4.8. A description of the sub-sectors can be found in *Profile & Trends 2007* (Ministry of Education 2008b).

Figure 10 shows the historical, forecast and projected demand for tertiary education by sub-sector by level of study. The data is derived by calculating expected student numbers for the sub-sector by level of study and age group, and then summing over all age groups.

The rapid rises and falls in demand for level 1 to 3 certificate-level study can be seen to have occurred primarily in universities⁷, wānanga and private training establishments, although institutes of technology and polytechnics also saw a rise in this type of enrolment.

Diploma-level study has been increasing in institutes of technology and polytechnics and private training establishments, and has been flat at universities. Wānanga saw a large increase in diploma-level study from 2000, and like certificate-level study, this has declined since 2003.

Students in bachelors-level study have been increasing at wānanga and private training establishments in recent times, but have been constant at universities and institutes of technology and polytechnics since 2000.

In terms of numbers of students, most bachelors and postgraduate-level study occurs in universities (with some bachelors study in institutes of technology and polytechnics). Most certificate and diploma-level study occurs in institutes of technology and polytechnics, where students are typically in the older age groups.

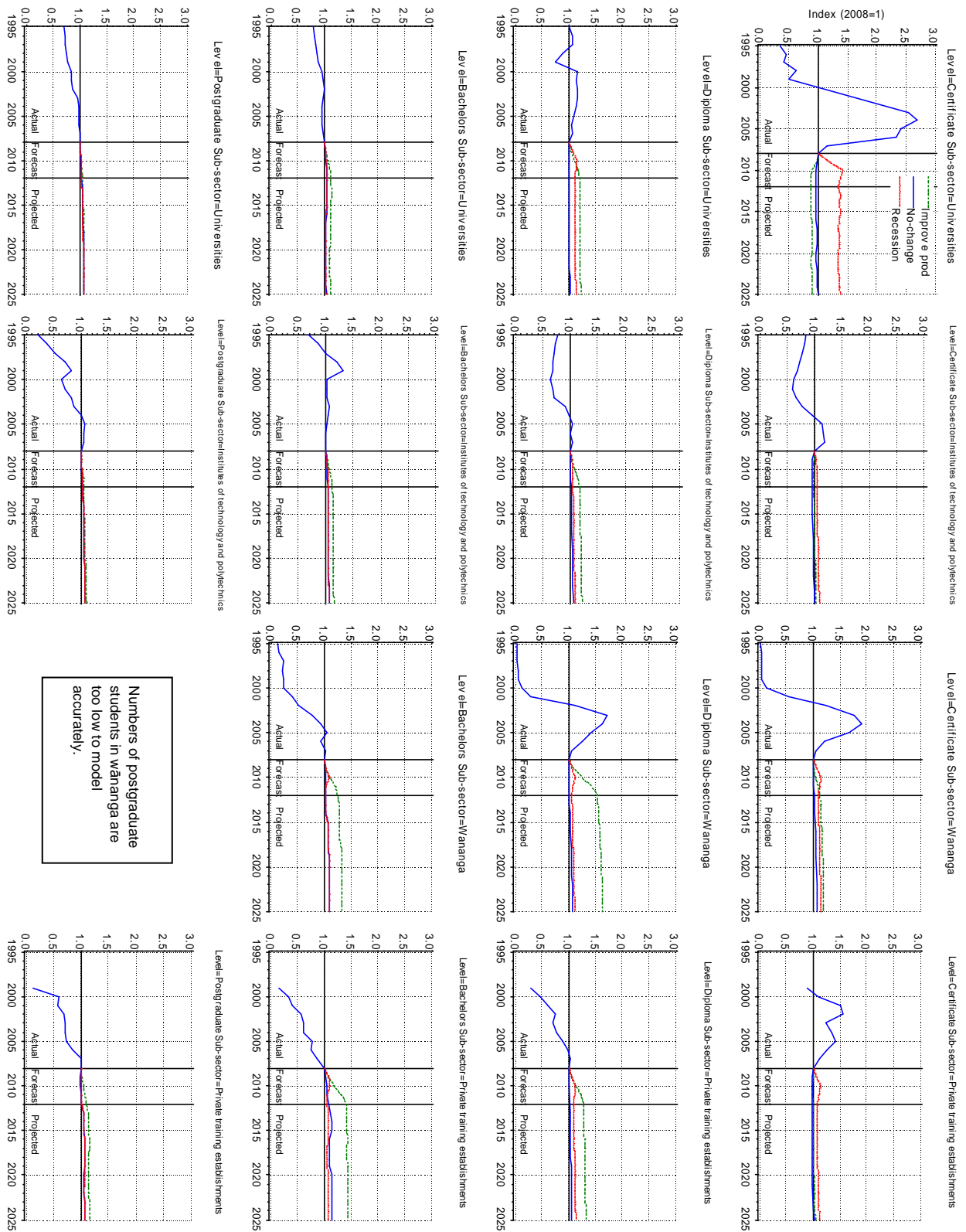
Note that the model results show how demand may vary for any particular sub-sector *relative* to the level of demand for that sub-sector in 2008. While the potential increase in students (and therefore demand) may be relatively small, that demand may still be difficult to meet if the infrastructure and resources are not able to change, or change quickly enough.

Returning to Figure 10, across all scenarios, demand for certificate-level study is likely to increase slightly for wānanga. Private training establishments and institutes of technology and polytechnics show little change in demand. For universities the result for certificate-level study is less certain. Under the recession scenario, demand is modelled to increase substantially (albeit off a low base, as discussed above), but the model shows that the improving productivity scenario and population change by itself are expected to see a slight reduction in demand.

All scenarios show demand for diploma-level study to increase slightly. In wānanga, the results are less certain, with a somewhat larger increase in demand expected under the improving productivity scenario.

⁷ It has been suggested that the increase in certificate-level attendance in the universities may be the result of mergers, for example, between Massey University and Wellington Polytechnic, and changes to the type of a provider, for example, when Auckland Institute of Technology became a university (David Earle personal communication). Care needs to be taken if using the results for certificate-level study at universities.

Figure 10
Demand for tertiary education by sub-sector and level of study



Data for private training establishments is only available from 1999 onwards.

For bachelors-level study, only the improving productivity scenario shows increasing demand in the longer term, more so for wānanga and private training establishments, less so for universities and institutes of technology and polytechnics. The recession scenario indicates a slight increase in demand in wānanga and private training establishments before falling back.

For postgraduate study, the three scenarios suggest that demand will increase at universities and institutes of technology and polytechnics. As mentioned previously, our scenarios envisage little impact on postgraduate study, so the trajectories of all three scenarios are almost identical, with demand being driven primarily by population change. In private training establishments, the improving productivity scenario shows a slightly higher level of demand.

4.6 Type of study

How old a student is and what they study, determines how they study, whether full-time or part-time. Table 3 shows the proportion of students studying part time or full time by level of study and age group for 2008 (the patterns are consistent across years).

Table 3

Percentage of students in part-time and full-time study in 2008 by age group and level of study

Age group	Certificate		Diploma		Bachelors		Postgraduate		All levels	
	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time
15 to 17	74	26	62	38	39	61	—	—	68	32
18 to 20	67	33	45	55	9	91	4	96	32	68
21 to 24	81	19	63	37	26	74	33	67	47	53
25 to 39	86	14	76	24	57	43	69	31	75	25
40 to 64	88	12	77	23	68	32	79	21	82	18
Total	83	17	70	30	33	67	61	39	64	36

Age group by level of study combinations with less than 100 students are not reported.

Those studying at certificate or diploma level are predominately studying part-time. Bachelors-level study is mostly full-time for those aged under 24 years, but part-time for older students, although overall two thirds of students study full-time. Postgraduate study is mostly part-time for older age groups and full-time for younger students.

Figure 11 shows the demand for tertiary education by part-timers and full-timers by level of study for the three scenarios, summed over all age groups.

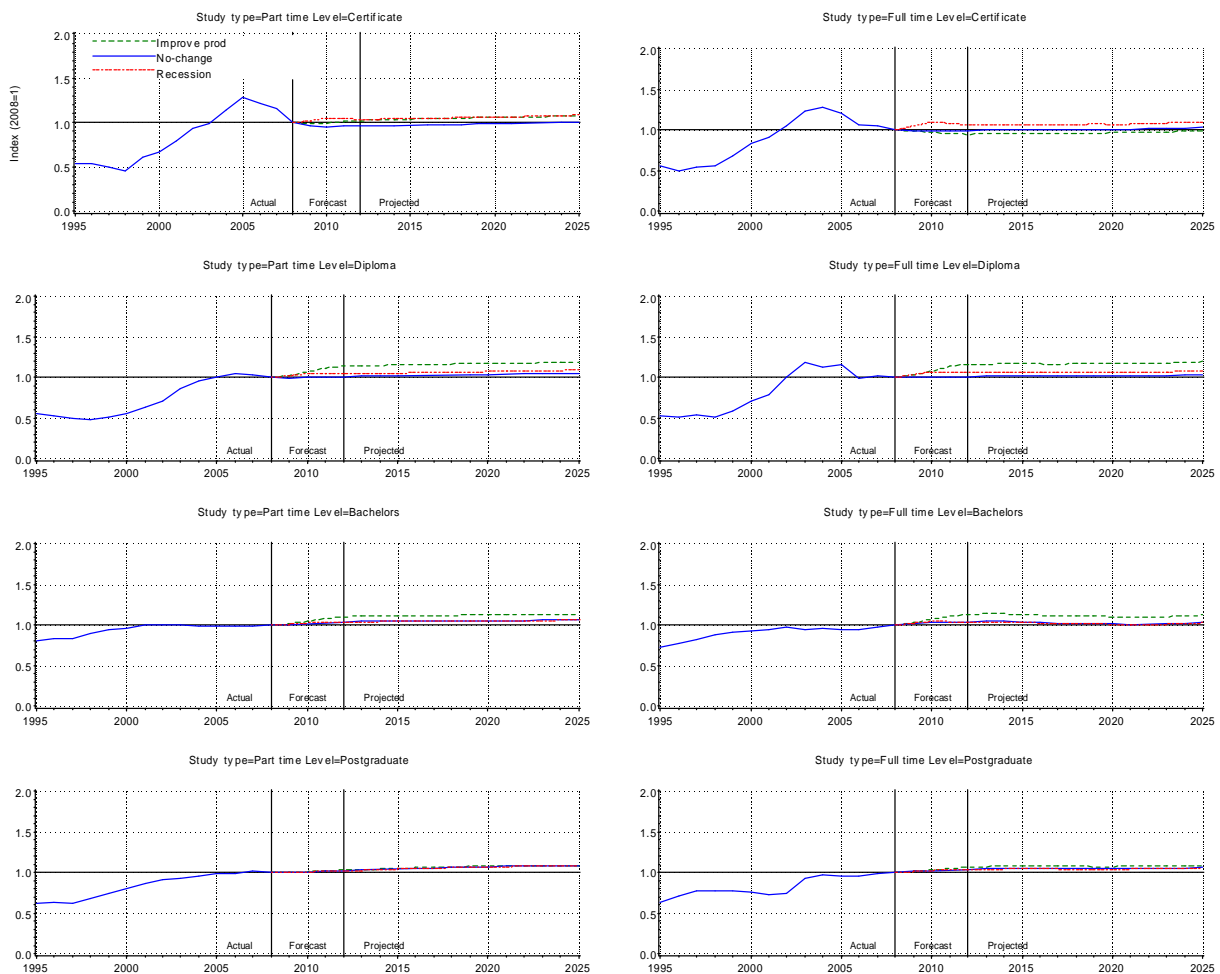
Full-time and part-time students have shown quite similar demand up to 2008 for tertiary education (in terms of student numbers relative to 2008 for each particular combination of variables). Demand for certificate-level study increased and then decreased again in recent years, although for full-time study this represented rather fewer students than for part-time study. Demand for diploma-level study has also increased, but since 2003 has flattened off for full-time students. Again there were fewer full-timers than part-timers studying diplomas. Bachelors and postgraduate demand has been relatively constant over the past 5 to 8 years.

Considering the forecasts and projections, it is interesting to contrast the differences in the trajectories for the three scenarios when considered by type of study (Figure 11) against those by age group (Figure 5 to Figure 7). Those for type of study are much closer together, indicating that differences between age groups are cancelled out when all age groups are considered together.

Results from the modelling show little differences between part-time and full-time study. Only in certificate-level study is there a slight difference, with the improving productivity scenario trajectory lower for full-time study compared with part-time study.

Lastly, how a student studies depends on why they are studying. Generally, if their aim is to gain a qualification such as a degree, they will usually study full-time. A person interested in taking a couple of courses to gain some specific skills or knowledge, but not a complete qualification, will usually study part-time. For these reasons, the demand for full-time or part-time study is not likely to be accurately predicted by demographic trends. When people's study intentions change, the relative demand for full- or part-time study will also change. For this reason, care should be exercised when using the results of this section.

Figure 11
Demand for tertiary education by type of study (full-time or part-time)



4.7 Gender

Across most age groups and levels of study, females participate at slightly higher levels than males. The greatest difference occurs in bachelors-level study for those aged 18 to 24 years. Overall, there are more females in tertiary education than males, although the difference in the relative proportions of each gender has been falling since 2004.

Forecast and projected changes in demand for tertiary education show little differences between the genders, either in total (see Figure 13), or when considered by age group or level of study. Overall results provide a good guide to demand by gender.

4.8 Industry training

Industry training⁸ is another important means whereby people improve their skills in vocational and trade-related areas. Employers use industry training to keep their workforce up to date with changes in their industry. More recently, the number of people in workplace training has risen, facilitated by increased funding by government and industry, and not least by skill shortages in the tight labour market experienced by New Zealand in recent years. Most industry training is undertaken at the certificate and diploma level.

It is likely that demand for industry training in recent years has been limited by the available funding; as funding increased, enrolments increased. It is likely that had more funding been available, more people would have undertaken this training. This makes it difficult to model demand because historical rates of participation have been set by an exogenous factor, funding, rather than something intrinsic to industry training (for instance, propensity to be involved in this type of training, and the ability of the training providers to cater for the demand). However, since industry training tracks the labour market because every trainee has to have a job, with current rising levels of unemployment, industry-training numbers are likely to fall.

The improving productivity scenario assumes moderate increases in the participation rate for all age groups for the next four years, and participation is then expected to stay flat. This implicitly assumes that funding continues to increase over these four years, and does not limit industry training.

For the recession scenario, the assumption is that as unemployment rises industry training will decline. The strength of the change is expected to be greater in the younger age groups than older ones. Reduced funding by industry, or by government, may also exacerbate the reduction in demand for industry training. After four years, participation rates remain at the levels they reached in 2012 and demographic change becomes the sole determinant of demand.

Figure 12 shows modelled demand for industry training by age group and gender for the three scenarios. The consistent increase from 2001 (the earliest reliable data) onwards is evident across all age groups and genders, although numbers of 15 to 17 year-old male trainees were steady from 2005.

The no-change scenario shows that demand from population increases will occur mostly for people aged 40 to 64 years, but also in the near term for 20 to 24 year-olds, and in the longer term for those aged 25 to 39 years.

The improving productivity scenario continues the strong upward trend seen in recent years and re-establishes this for 15 to 17 year-old males. The recession scenario is expected to lead to a reduction in demand for industry training. The effect of the underlying population trend on the trajectories is also apparent. What is also quite clear is the large difference in the trajectories for each age group and gender combination, indicating the modelled outcomes are far from certain.

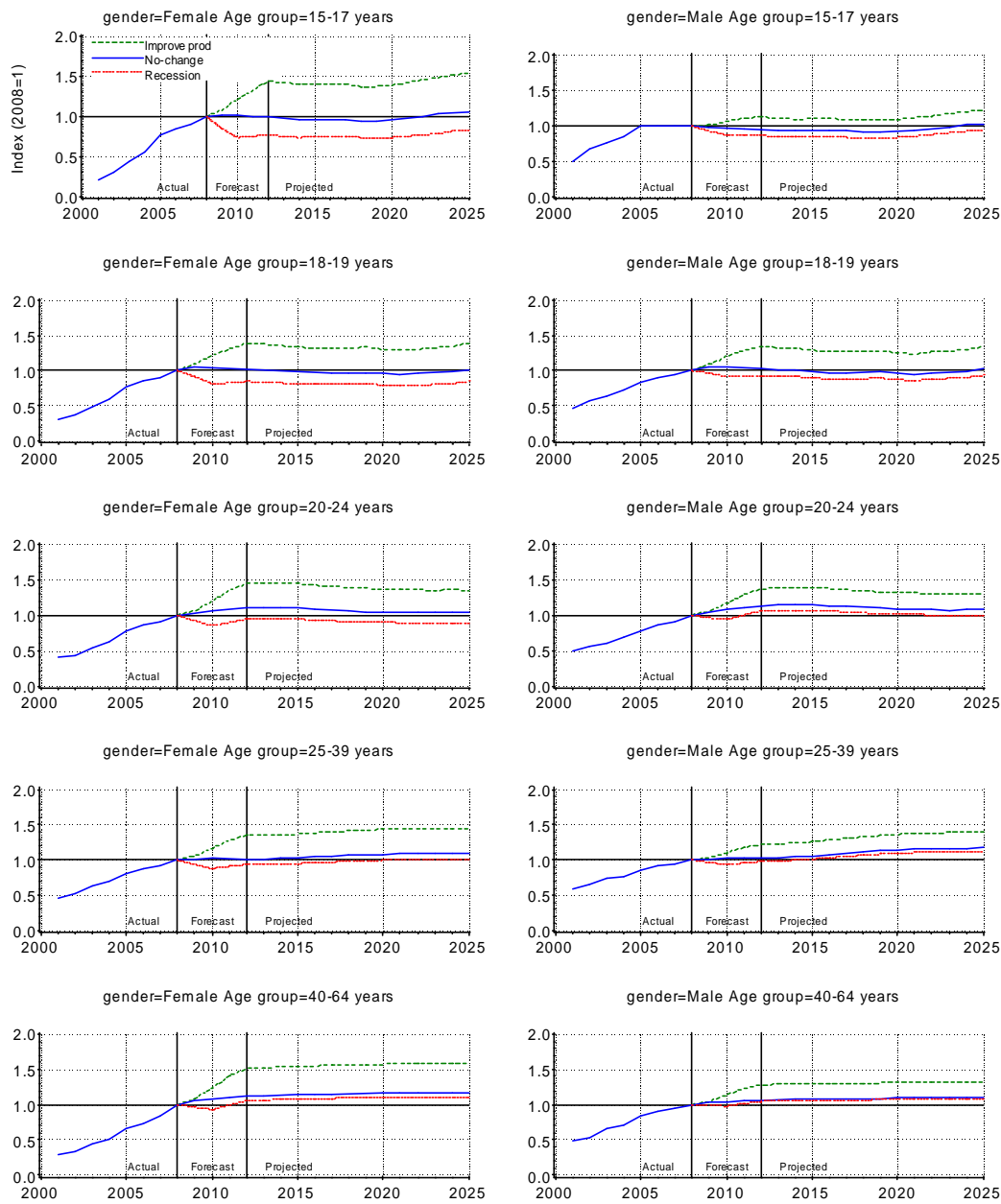
Unlike the demand in provider-based study, there are quite large differences in participation in industry training between the genders. Males are more likely to be in industry training than

⁸ The government also funds a number of other labour market programmes that use training and education to help people enter the workforce. Youth Training is for youth up to the age of 18 who have left school with no or very low-level qualifications. Training Opportunities is a labour market programme for people aged 18 and over who are considered disadvantaged in terms of employment and educational achievement (Ministry of Education 2008b, p.110). Demand for these schemes has not been modelled in this study.

females (although there will be differences between particular industry types, for example hairdressing and carpentry). In contrast, enrolments by females in industry training have been increasing at a faster rate than for males. This results in more rapid changes in the modelled demand for industry training for females.

The high dependence of industry training on funding by industry and government makes the outcomes for this type of tertiary education quite uncertain during a recession. While funding may be expected to decline, funding might just as likely increase (or at least be maintained) due to initiatives aimed at lessening the effect of the recession on employment, and on maintaining existing training schemes.

Figure 12
Demand for industry training by age group and gender



4.9 Ethnic groups

The study considered the demand for tertiary education by New Zealand's four main ethnic groups: Māori, Pasifika, Asian and European.

Ethnic population projections are less accurate than whole-of-population projections (Statistics New Zealand 2008a), so care should be taken when using the results of the following sections. Section 8.4 discusses the accuracy of projections more generally. In addition, the ethnic data is based on a person's total response to their ethnic affiliations; that is, a person who belongs to more than one ethnic group is counted in each ethnic group they identify with. This means that for some groups, in particular Māori and Pasifika, there is some overlap. The results based on the total population projections give the magnitude of changes in tertiary demand, while this section shows how that demand may vary *within* any particular ethnic group.

For these reasons, scenarios were not used to project demand for the individual ethnic groups. The projections are based on the no-change scenario, where the participation rate is kept at 2008 levels and changes in demand are based solely on population projections.

The eventual changes in demand will of course depend on the effect of government policy and the recession. We have already discussed the impact these may have on the various age groups, level of study and on industry training. It is likely however that these effects will not be the same for each ethnic group. Unemployment, the primary driver of tertiary participation during a recession, will be higher for younger people, but also for those less qualified. It is likely therefore that any changes in demand for tertiary education because of the recession may be more pronounced in the Māori and Pasifika ethnic groups than that suggested by population change alone.

Offsetting this to some extent will be government policies designed to increase literacy, numeracy and language skills in the workforce. These will most likely target Māori, Pasifika and Asian peoples since, in general, these groups will have lower levels of English literacy (Ministry of Education 2007a). Again, this could result in changes in demand greater than that suggested by population change alone.

The following sections discuss the model results for the ethnic groups by gender, age group, level of study and industry training.

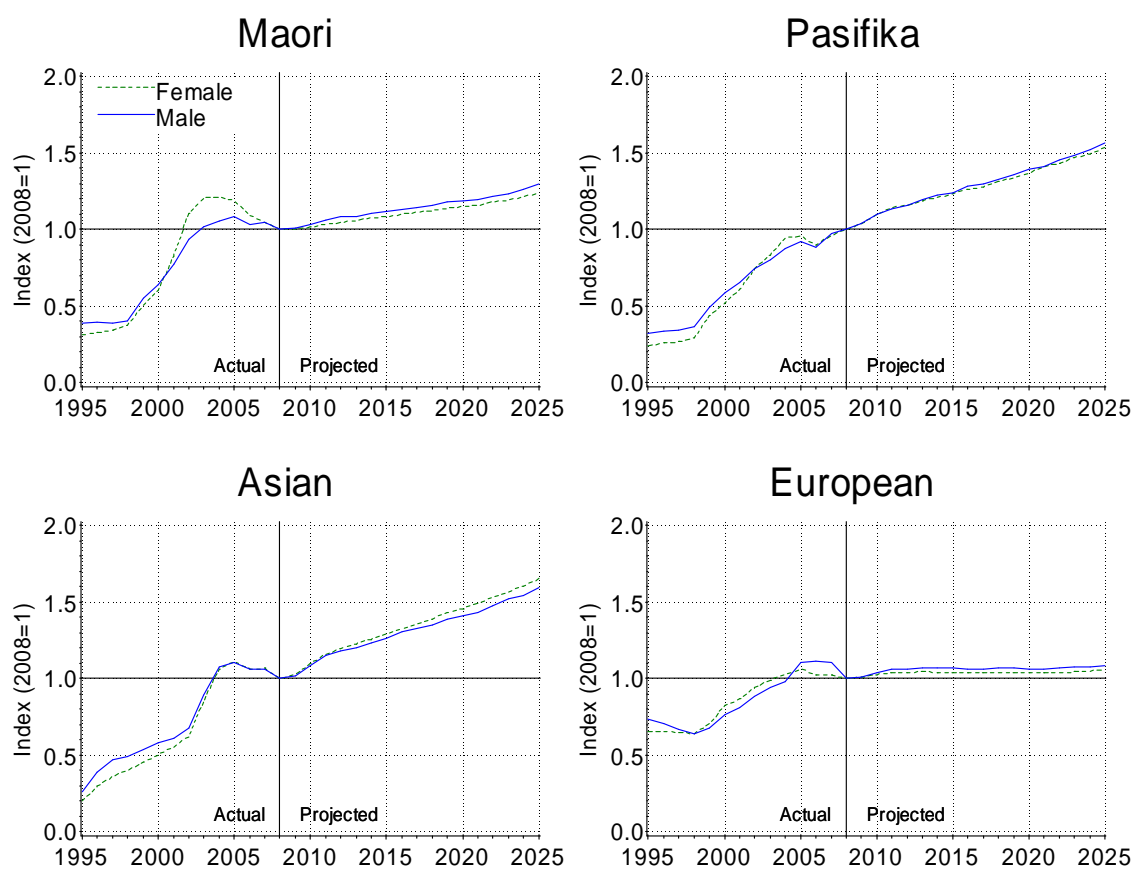
Gender

There are very few differences in demand for tertiary education within an ethnic group by gender and age group (data not shown), with Māori and Pasifika aged 20 to 24 years being the only exceptions. For these groups the demand by males is projected to increase slightly more quickly than for females, and plateau at a higher level. Because of this, gender and age group are presented separately to show trends more clearly.

Figure 13 shows the overall demand for provider-based tertiary education for the ethnic groups by gender, across all age groups, levels of study and sub-sectors, indexed to 2008. It is clear that there is little difference in demand by men and women, either historically (apart from Māori between 2002 and 2007) or in our modelled results.

Overall the relative changes in demand between the ethnic groups are clear, and directly reflect the relative changes in size of the different population groups (refer to Figure 4).

Figure 13
Demand for tertiary education by ethnic group and gender



Age group

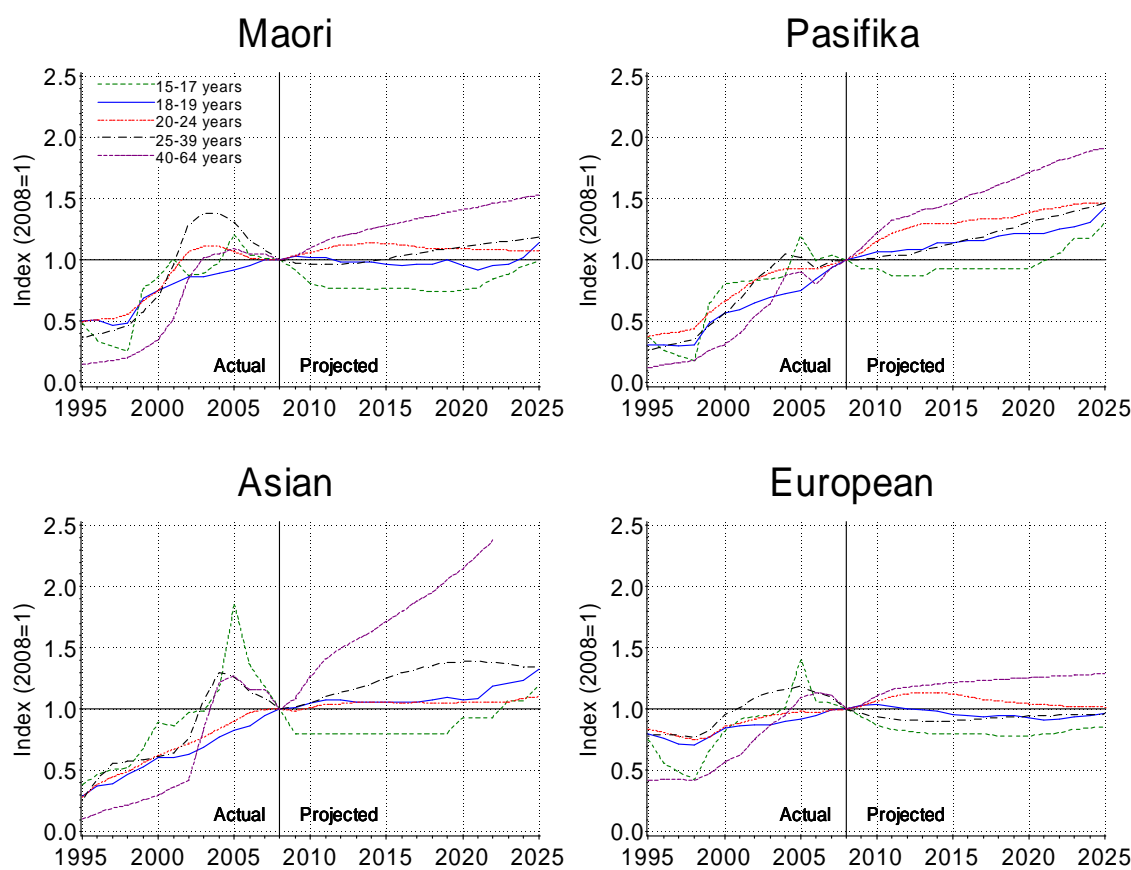
Figure 14 shows provider-based tertiary demand (indexed to 2008) for the main ethnic groups by age group, across all levels of study and sub-sectors.

The pattern follows the results we have seen for the whole population (see Figure 2). For each ethnic group the largest increase in demand occurs for people aged 40 to 64 years.

People 15 to 17 years consistently show an initial decline in demand across all ethnic groups, followed by a period of relatively constant demand. Demand is then projected to increase around 2020, with Pasifika and Asian peoples showing the largest increases, reaching levels of demand after 2020 that are higher than in 2008.

The other age groups show a variety of trajectories. The most consistent increases in demand occur in the Pasifika population. To reiterate, because the models using ethnic group only use the no-change scenario, demand is driven solely by population trends and 2008 participation rates. They are therefore similar to the population trends presented in Figure 2.

Figure 14
Demand for provider-based tertiary education by ethnic group and age group



Level of study

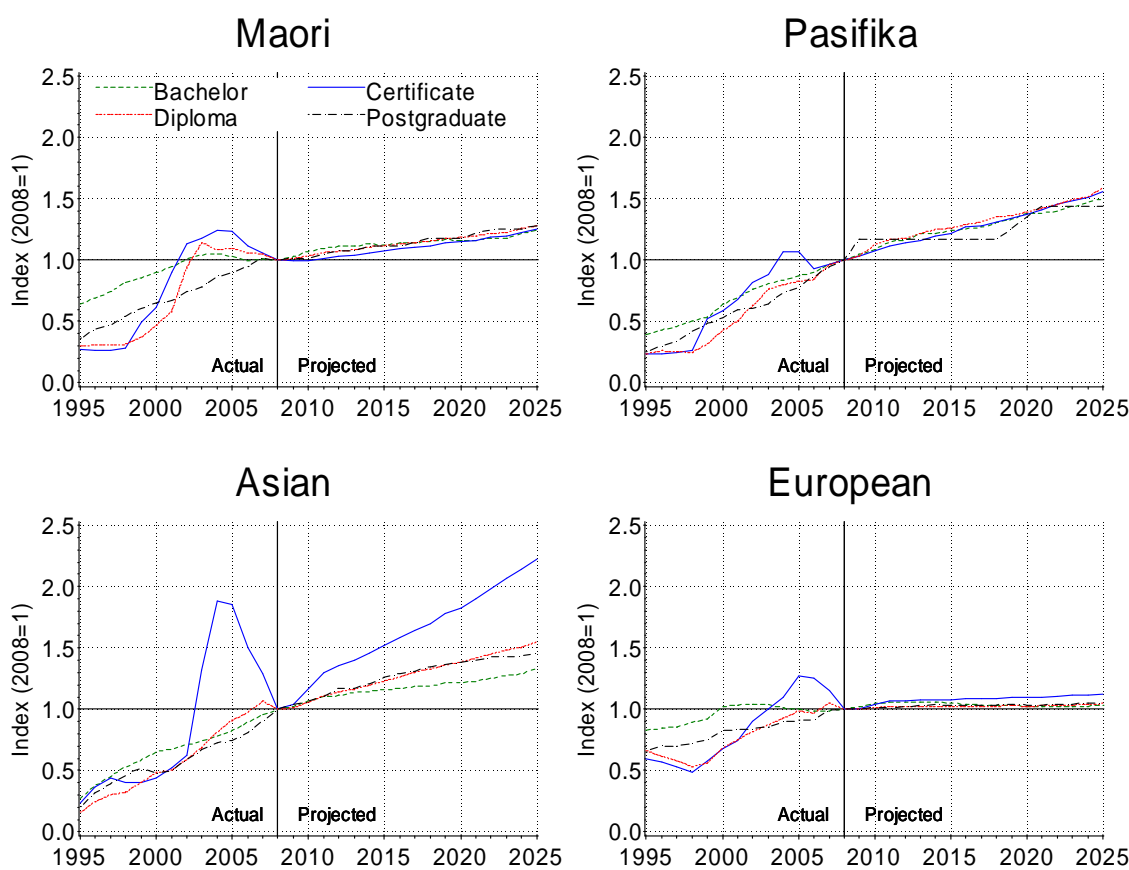
Figure 15 shows the overall demand for tertiary education for each ethnic group by level of study, across all age groups and sub-sectors.

There have been large shifts in demand in the recent past in all ethnic groups, but the relative changes within those groups have been different. The most obvious one is the increase in the demand for certificate-level courses, although the timing and rate of change were not the same for each ethnic group. For Māori the increased demand for certificate-level study also corresponded with a rise in demand for diploma-level study. Demand for bachelors-level study has been relatively stable for Europeans since 2000, and since 2002 for Māori, but has been increasing in the other two ethnic groups.

The changes in the overall number of enrolments at certificate-level have been discussed in section 4.1. A full account of the strategies to reduce enrolments in non-degree courses can be read in *Profile & Trends 2006* (Ministry of Education 2007b p92). This data here updates that account by another two years. It clearly shows the continuing decline in enrolments up to 2008 for most ethnic groups, but with Pasifika increasing again from 2006 to 2008. Overall, the strategies to reduce enrolments in non-degree qualifications have proven to be successful.

Except for the Asian ethnic group, the projected demand is quite consistent across levels of study. For Asians, the demand for certificate-level study is projected to increase the most, and for bachelors-level study the least. For Europeans, demand for certificate-level study is projected to stay at higher levels over time than for other qualifications.

Figure 15
Demand for tertiary education by ethnic group and level of study



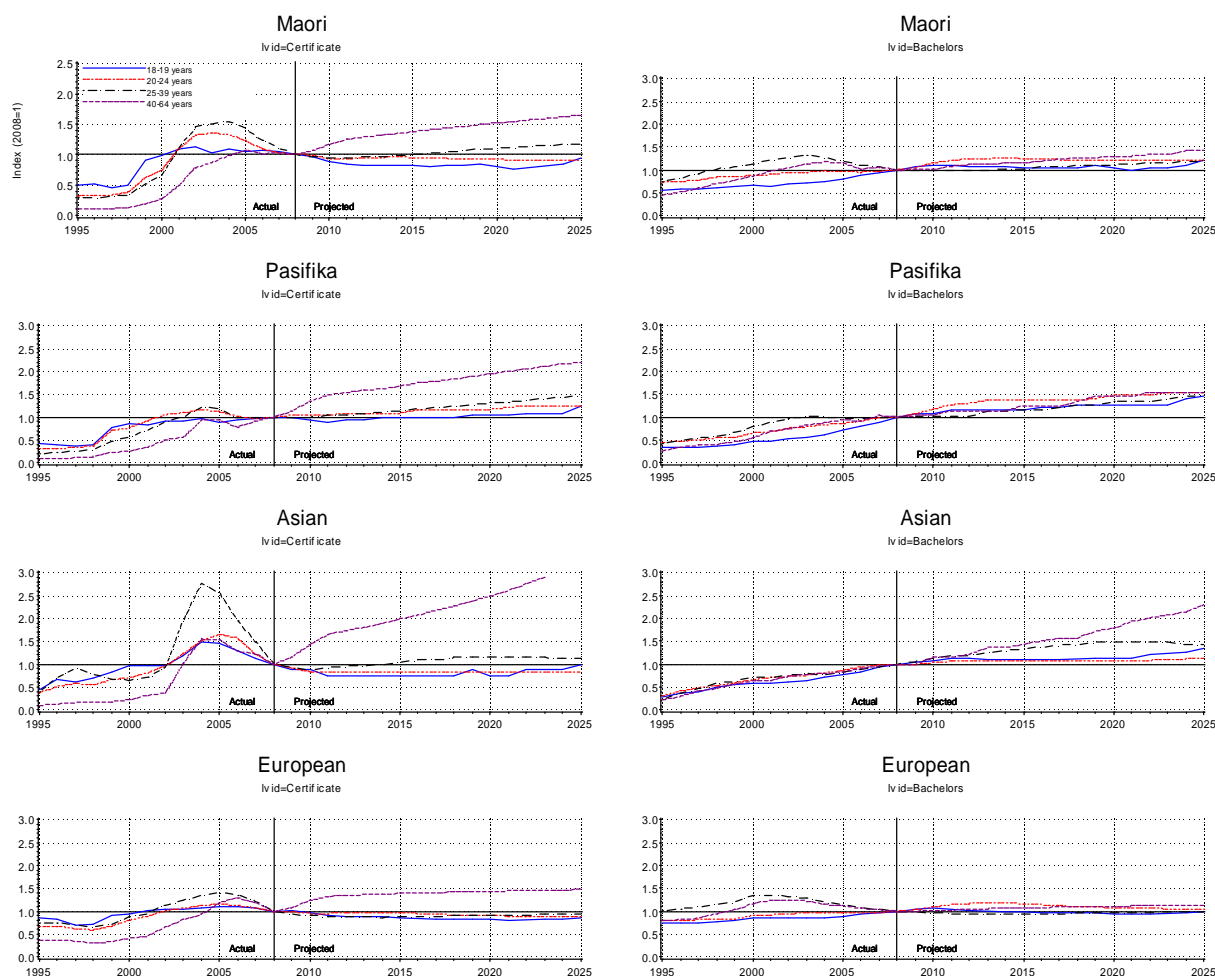
Level of study and age group

It is instructive to consider level of study and age group together. People of different ages predominately study at different levels, and considering these variables separately hides the interaction between them. However, at this level of breakdown, the number of students in any one category can become small, and together with the higher level of unreliability in ethnic population projections, care needs to be taken when using these results. Only results for certificate- and bachelors-level study are presented, and the 15 to 17 year-old age group is omitted (see Figure 16).

Based just on population trends, people aged 40 to 64 years dominate the growth in demand for certificate-level study. Demand by Europeans is seen to plateau after 2010, but continues to rise for the other ethnic groups. Asians show the greatest increase in demand.

The patterns in changing demand for bachelors-level study are quite different. Here, apart from Asians, the age groups are far more similar. Europeans show almost no appreciable increase in demand, Māori a slight increase, and Pasifika slightly more. For Asians aged 18 to 24 there is almost no increase in demand, but for Asians 25 to 64 years-old, demand for bachelors-level study rises.

Figure 16
Demand for tertiary education by level of study (certificate and bachelors) by age group



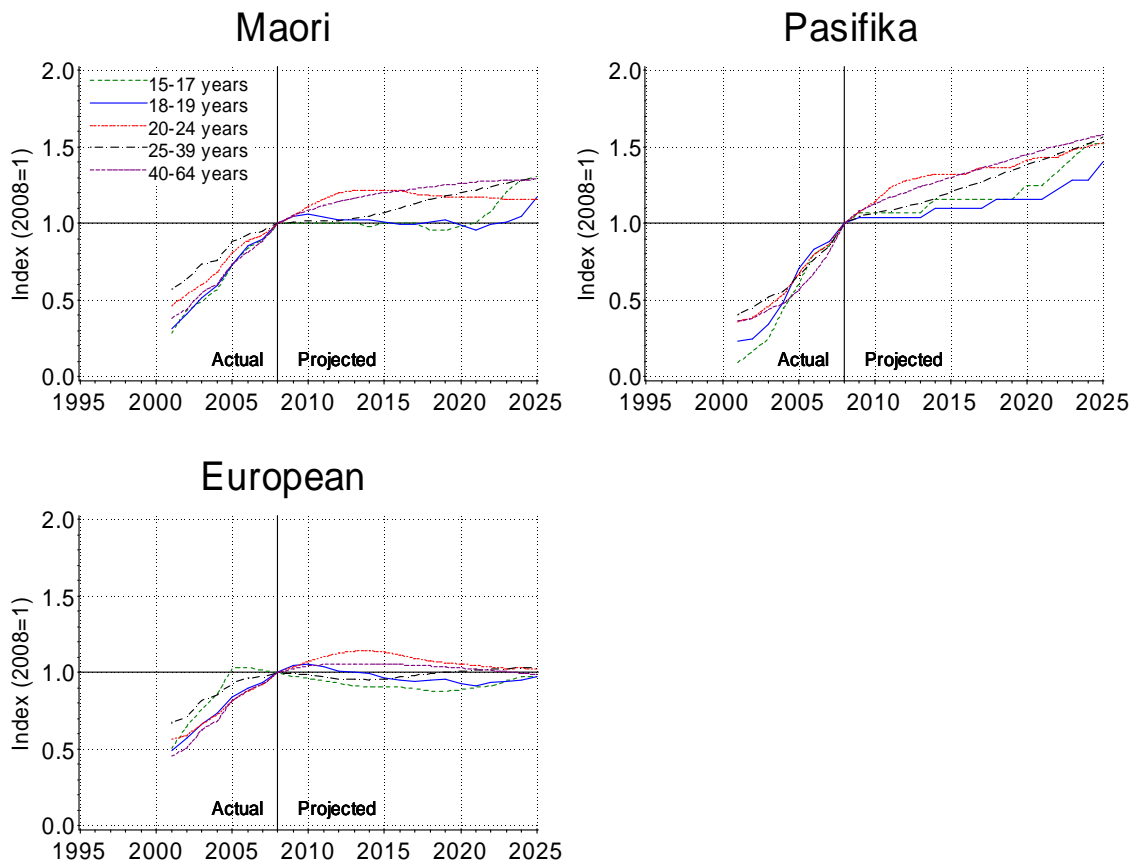
Industry training

Figure 17 shows the demand for industry training by ethnic group and age group. Asians are not represented in this data as so few of them are recorded as undertaking industry training.

Changes in demand for industry training up to 2008 has been quite consistent across ethnic groups, although demand from 15 to 17 year-old Europeans rose more steeply up to 2005 and then slightly declined. In addition, Pasifika peoples in all age groups showed a more rapid increase than others, but starting from a lower base.

The projected demand is less consistent between the ethnic groups. Pasifika shows the strongest increase in demand, with all age groups rising above 2008 levels. Māori show increasing demand for industry training for people aged 25 years and over, but little change in demand for people aged under 20 years. Europeans show little change in demand by 2025, with some age groups rising and then falling in demand, while others fall then rise. Note that the trajectories for Pasifika show step-wise changes for some age groups, the result of the rounding used in the model calculations on the low numbers of Pasifika in industry training.

Figure 17
Demand for industry training by ethnic group and age group

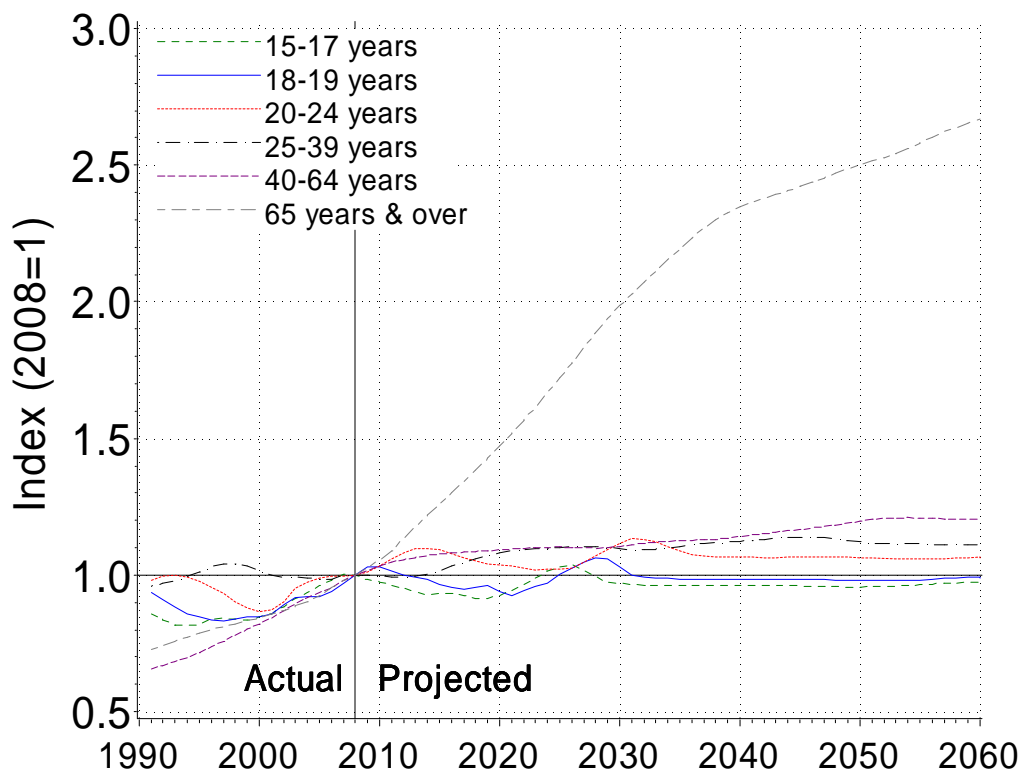


5 POPULATION TRENDS TO 2060

The longer into the future one projects, the less certainty there is in the outcome. The timing and severity of events such as economic downturns, and natural or man-made disasters are unpredictable, and these impact the birth and death rate and migration, on which population projections are based. Global climate change may also have an impact during this time horizon. Lastly, attitudes to the size of families and to education may change, both because of changing social and environmental conditions, and, if current trends continue, because of the increasing level of educational attainment across all levels of society (Ministry of Education 2008b). With these caveats in mind, what can be said about the projected changes in demand out to 2060?

Figure 18 shows the indexed overall population changes between 1991 and 2060. The most striking feature is the rapid relative increase in numbers of people aged 65 years and over, although after 2040 the rate decreases somewhat. However, this group is not likely to place much demand on tertiary education, particularly considering that this group of people will become more and more educated the further into the future we look. Where this group may have a larger impact is on the level of available public resources for education. If a greater proportion of public money needs to be spent on health for older people, for example, less will be available for the education of younger people.

Figure 18
Trends in the New Zealand population from 1991 to 2060 by age group



Source: Statistics New Zealand population estimates and projections, 2006 base.
The index base is set to 2008, making this graph comparable with others in this report. Strictly, actual values are only available up to 2006. Population projections have been used for 2007 and 2008.

The other age groups show quite different trends. Of particular interest are the 18 to 19 and 20 to 24 year-olds. The graph shows successive waves of higher population numbers, with peaks in

2009 and 2029 for those aged 18 to 19 years, and 2013 and 2031 for those aged 20 to 24 years. While the increases relative to 2008 are not large compared to those aged 65 years and over, they are nonetheless large enough to place pressure on tertiary education services and infrastructure designed to cope with demand at 2008 levels. These fluctuating levels as sub-populations grow and decline adds further unpredictability to the projections for demand.

The 40 to 64 year age group also grows. This is likely to translate into increasing demand for tertiary education, but may be more easily accommodated since there are not the rises and falls that occur in the younger age groups. The 40 to 64 year-old people in future are likely to have longer working lives than those today, which may mean using education to maintain or enhance skill levels to keep jobs or for promotion.

A further consideration is that as time goes on, the population in general will become more educated, continuing a trend seen in recent decades. This will affect demand via inter-generational influences, where children of tertiary educated parents are more likely to themselves be tertiary educated.

As noted previously, there is essentially no difference between genders in the projections, and certainly no significant shift in the relative population sizes of males and females. Any gender disparities present today are not likely to be altered via population change alone.

6 VARYING THE LENGTH OF THE RECESSION IN THE MODEL

As this report was being finalised the economic indications suggested a deeper and longer recession was likely. The four-year period for the recession selected in the model may be too short.

Rather than redo the report with a longer (but still arbitrary) length of recession, it was decided to consider how the model behaves for a range of years. This serves both to show the sensitivity of the model under these varying conditions, and to give the reader a guide as to the uncertainty in demand when the expected length of the recession is varied.

Figure 19 shows demand for tertiary education by level of study, indexed to 2008, for the no-change and recession scenarios with the recession modelled with 4, 6 and 8 year periods. The first half of each recession period is modelled using changing participation rates in line with the characteristics of the recession scenario (see Table 5) and the second half is the recovery period.

Figure 19
Demand for tertiary education by level of study for different recession periods

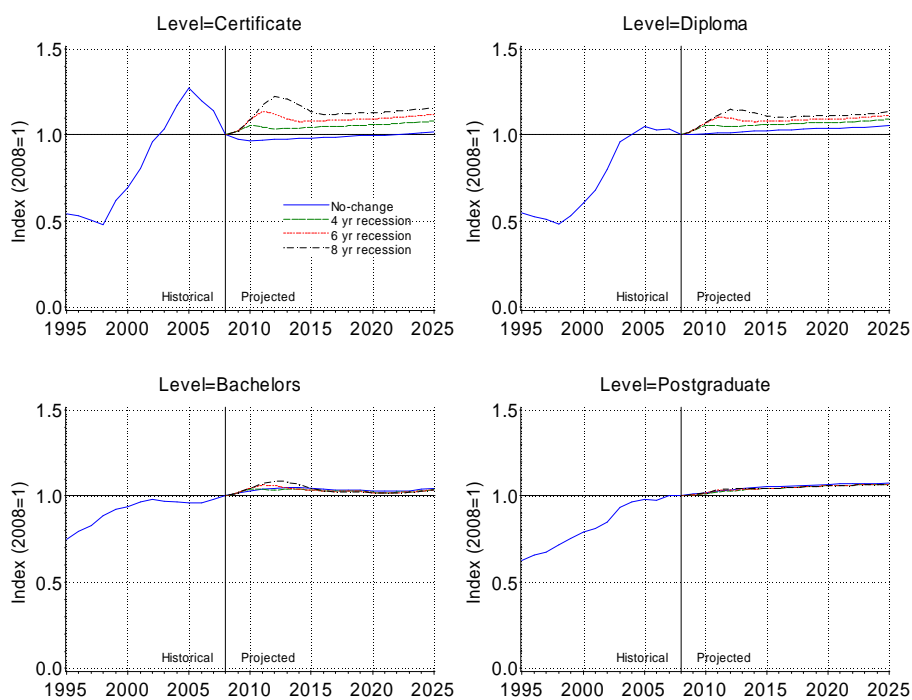


Figure 19 shows that certificate-level study is affected the most, then diploma-level study, while varying the length of the recession has a low-level impact on bachelors-level study and virtually no impact on postgraduate study.⁹

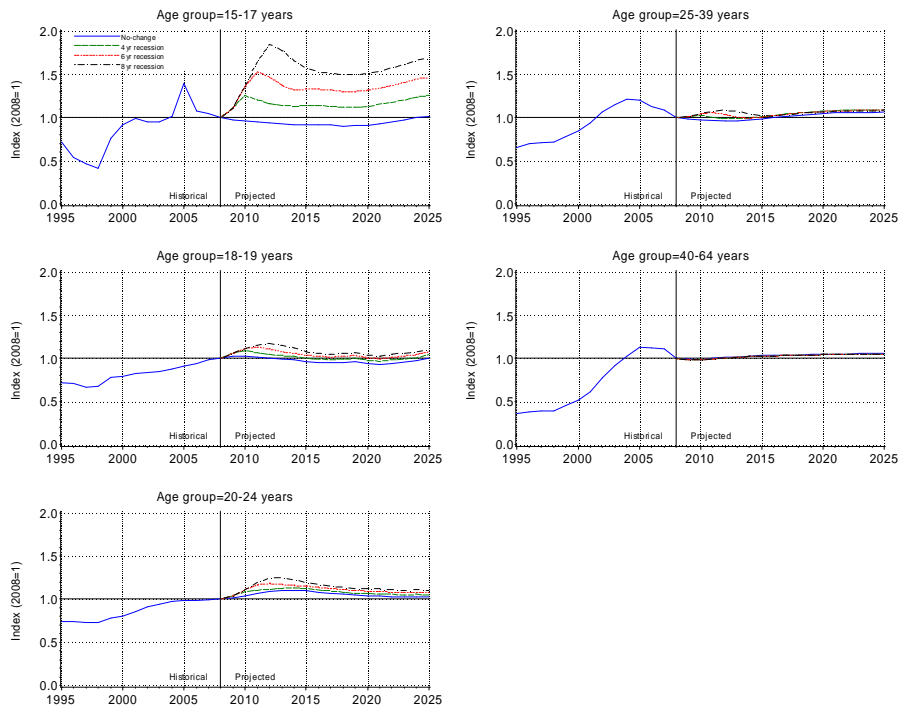
The figure also shows that the model behaves predictably with increases in the length of the modelled recession. The longer the higher levels of demand operate, the higher the post-

⁹ As the length of the recession increases, the number of school leavers with qualifications that will allow them to undertake tertiary study will also likely increase (Smart forthcoming). This will predominately affect bachelor-level study, and mostly the 18-to-19-year-age group in the short term.

recession demand. This behaviour is consistent with patterns of demand observed elsewhere; increases in student numbers caused by rising unemployment do not fall back once unemployment falls again, but remain at the higher levels (Usher and Dunn 2009). At the end of the modelled participation period, these higher levels are the starting points for the demographically driven demand trajectories.

Figure 20 shows the changes in demand for age group using the same modelling parameters as Figure 19. The 15 to 17 year age group shows the greatest sensitivity to the length of the recession parameter, with 18 to 19 years and 20 to 24 years age groups next most sensitive. The other age groups, particularly the 40 to 64 years age group, exhibit patterns of demand that are quite resistant to the length of the recession.

Figure 20
Demand for tertiary education by age group for different recession periods



7 DISCUSSION

7.1 The recession and uncertainty

This study has focussed on the expected change in demand for tertiary education based on three scenarios of participation in tertiary education. It does not report on estimates of student numbers because of the difficulties inherent in making accurate forecasts during a period of economic recession. In addition, there is the uncertainty in the underlying population projections and the risks involved in predicting future behaviour based on past trends.

The length and strength of the economic downturn is also unknown. If employment levels fall further than expected, or stays at depressed levels for longer, demand for tertiary education as envisaged in this study may change. The effect will be either to strengthen the response we have envisaged in our scenarios, or to induce changes in groups that we have assumed will not be affected. In either case, it is likely that the direction of change in participation, and therefore demand, will remain as we have indicated.

What is quite clear is that the recession will change the demand for tertiary education significantly in the short term. Moreover, this demand, even if partially met, will work against efforts to increase the number of people with higher level qualifications, a prerequisite to increase the store of human capital and ultimately improve New Zealand's productivity. This is because it appears the largest increase in demand will be for certificate-level study, which, ideally, should see reducing demand. In addition, the recession will dampen demand for diploma-level study compared to what might have been expected if efforts to increase participation were successful. Bachelors-level study is also affected, but to a lesser extent.

It is an observable fact that when levels of tertiary participation change because of some external pressure (say higher unemployment), once that pressure eases, participation does not always revert to its previous levels (Usher and Dunn 2009, Smart forthcoming¹⁰). The implication is that the levels of tertiary participation resulting from the recession may persist even after the recession is over. It may take some time, or only with special interventions, to lower participation levels again in certificate-level study, or raise them in diploma-level study.

This is not to say that certificate-level study *per se* is not a good outcome for many people. Those with low skills, or without qualifications that enable them to study at a higher level, can use certificate-level study as an entry point to higher-level study or higher-value employment. And improving skill levels at any level is in itself a worthwhile outcome.

Similar uncertainty occurs for industry training. Fewer people in employment will normally result in fewer people undertaking industry training, given the same level of funding. However, if initiatives to limit unemployment levels are successful this may lessen the decline in the numbers in industry training that we have envisaged. Already the New Zealand Industry Training Federation has called on the government to introduce subsidies and cash payments for employers to encourage them to keep their apprentices despite the recession (New Zealand Education Review 2009b).

The other major factor contributing to the uncertainty in this work was the election of a new government in New Zealand in late 2008. At the time of writing, it was not known how the tertiary education system would be altered as a result of changing policies and priorities.

¹⁰ Smart, in his forthcoming paper, considers the links between economic cycles and participation in school and tertiary institutions. His data showed increasing participation during times of rising unemployment, but participation rates do not necessarily decrease once economic conditions improved.

However, regardless of any changes, it is likely that the broad goal of increasing the number of people in New Zealand with higher-level qualifications will be maintained, a necessary precursor to help lift New Zealand's productivity.

If demand for places in tertiary providers increases and this demand is *not* met (for whatever reason), competition will increase for those places that are available (this is already happening in the United Kingdom during this recession — see The Guardian 2009). Those people more qualified in terms of meeting entry requirements will usually gain places over those less qualified. Alternatively, higher standards may be used to reduce student numbers progressing to the next year of study. If this does occur, there are implications for the equity of access to tertiary education and the longer-term prospects of increasing New Zealand's human capital.

7.2 Increasing ethnic diversity

The relative proportions of the different ethnic groups in New Zealand will change over the coming decades. The numbers of Māori, Pasifika and Asian people will increase, although Europeans will still be the largest single ethnic group. In addition, for Māori and Pasifika particularly, these groups will make up the majority of the younger aged population, those more likely to be undertaking tertiary education.

While tertiary providers will not need to alter what courses they offer, how they are offered may need to change to cater for this increasing ethnic demand. The level of support for students whose first language is not English will be greater, and non-academic services (counselling, career guidance, medical services) may need to change as well. Academic staff may also need to change to reflect the ethnic composition of students.

The most rapidly increasing ethnic group is Asian, but for this group it is the older age groups that show the largest relative increases. Our modelling suggests it will be certificate-level study by this group that will see the largest increase in demand, but this may well be off a small base. It is known that migration plays a more important role in Asian population numbers, so policies and factors that affect migration will also be important in determining demand in this ethnic group.

7.3 An ageing population

While the largest relative increase in population size by far occurs for people aged 65 years and over, we don't expect this group to exert much demand for formal tertiary education. This group is under-represented in tertiary student numbers at present, and with increasing levels of educational attainment in the population in the future, this is unlikely to change. However, with increasing life expectancy, this group may increase demand for recreational study.

This group may have a further indirect effect, resulting from how society balances the funding of education for the young against health care for the elderly.

The numbers of people aged 40 to 64 will also increase over the next 40 years, although not as dramatically as the older group. Unlike those over 64 years, people aged 40 to 64 years are expected to place increasing demands on tertiary education. In future, there will be a need for people that are able to work to remain in work, helping to maintain a workforce with increasing numbers dependent on it. This in turn will mean people will have to maintain or increase their skills as technology and career expectations change, or to keep up with increasing skill levels in their younger colleagues. Further tertiary education could also provide the basis for career advancement, or indeed changes in careers as individual's aspirations and society's requirements change. This is likely to occur even though tomorrow's 40 to 64 year-olds will be on average more educated than those of today.

A further, albeit indirect, effect of this concerns inter-generational effects and educational inheritance. Children of more educated people have a higher propensity to undertake tertiary study themselves (Ministry of Education 2008b pp 52–56). But more educated parents on average have smaller families. The outcomes of an ageing population in the longer term are therefore far from certain.

7.4 Other models of tertiary education demand

Other authors have produced tertiary student projections using scenarios. Recent reports by the Higher Education Policy Institute (HEPI) in the United Kingdom (Bekhradnia 2007, Bekhradnia and Bailey 2008) use population projections to determine tertiary enrolments in terms of student numbers and full-time equivalent student units. A recent book published by the OECD, *Higher education to 2030. Volume 1: Demography*, used population projections in OECD and other countries and scenarios to model tertiary student numbers (Vincent-Lancrin 2008).

The results and underlying methodology used in these studies are not strictly comparable with this study. For example, the HEPI studies focus almost exclusively on those aged under 30 years, with their main client group being those aged 18 to 20 years. In New Zealand a far higher proportion of older people undertake tertiary studies so more age groups are included in this study.

A *status quo* or no-change scenario, keeping participation rates constant, features in both studies, but they include only one other scenario in which participation increases. In the 2008 HEPI study (Bekhradnia and Bailey 2008) the increase in participation results from a higher proportion of males entering tertiary education; worst performing regions improving their performance to the average; and above average pupils continuing onto tertiary education, rather than dropping out. In the OECD work, participation rates from 2000 to 2004 are linearly extrapolated for each country, up to a maximum of 90 percent. The timing of these studies, coming before the global recession, meant that a less optimistic scenario was not contemplated.

A further difference between those studies and this one is that we do not report student numbers (or full-time equivalent units). Reporting student numbers as if they represent the number of students in the future, in our opinion, gives the impression that all demand will be met. Here, we report demand, certainly based on potential student numbers, as an index relative to demand in 2008.

8 DATA, METHODS AND LIMITATIONS

8.1 Data sources and definitions

Population data

The following population data was obtained from Statistics New Zealand:

- New Zealand national resident population projections (2006 base) by single year of age and gender (2006 to 2061, series 1 to 9);
- New Zealand resident ethnic population projections (2006 base) for the European, Māori, Pasifika and Asian ethnic groups by single year of age and gender (2006 to 2026);
- Māori resident population estimates by single year of age and gender (1991 to 2007); and
- European, Māori, Pasifika and Asian ethnic group resident population estimates for census years by single year of age and gender (1996, 2001 and 2006).

The level 1 ethnicity classification was used for ethnic groups from Statistics New Zealand's Ethnicity New Zealand Standard Classification 2005. This groups all ethnic groups into six categories: European, Māori, Pasifika, Asian, Middle Eastern/Latin American/Africa (MELAA), and Other. In this study the latter two groups are ignored since population projections are not available for these groups. Numbers in the MELAA group are also too small to model accurately. People considering themselves as 'New Zealander' were included in the European category.

In 2008, Statistics New Zealand indicated that their population projections based on the 2006 census were already too low for the 2007 and 2008 birth cohorts. The New Zealand birth rate that had increased over the past few years and had unexpectedly accelerated in 2007 and 2008. On their advice, the final population projections were based on a blend of two projection series: the series 5 (medium fertility, medium mortality and long-term net migration level of 10,000) as the base projection and series 8 (high fertility, medium mortality and long-term net migration level of 10,000). The series 8 projections were used in 2009 for the year 0 cohort, in 2010 for the year 0 and 1 cohorts, and in 2011 for the year 0, 1 and 2 cohorts. This three-year group of series 8 figures were then aged progressively year by year through the series 5 projections.

It should be noted however that this adjustment to the population projections has no impact on tertiary demand until after 2023. This is because those projected to be born after 2008 will not be older than 15 till after 2023.

Population estimates were available for each year for the Māori ethnic group. For other ethnic groups estimates were only available for census years. For these groups population numbers between census years were interpolated using a cubic spline curve fitting methodology.

Provider-based student numbers

Data on students enrolled in tertiary education providers was obtained from the Ministry's own Tertiary Sector Enrolment and Completion (TSEC) data.

Records for students were used that were in formally assessed courses of more than one week's equivalent full-time duration. Enrolments were excluded for students in Training Opportunities, Youth Training, and Skill Enhancement programmes, and students in formal qualifications in private training establishments that receive no funding assistance from government.

Enrolments from 1995 to 2008 were extracted by gender, age group, ethnic group, level of study, type of study (full-time or part-time) and provider type (also known as sub-sector).

The ethnic group data is based on multiple responses. That is, a student may be counted in up to three different ethnic groups. This also applies to sub-sector and level of study. Students are counted in each course they are enrolled in. This means that summing enrolments across ethnic groups, sub-sectors, or levels of study (or any combination of these) will over-count the total number of students. In this study totals of unique students were counted and reported separately. Totals were however summed over age group and gender, and although there are some students with multiple genders and/or ages, the errors resulting from this double counting were insignificant.

The levels of study categories were defined in the following way:

- certificates—levels 1 to 3 offered at tertiary providers;
- diplomas—level 4 certificates and level 5 to 7 diplomas;
- bachelors—bachelor degrees only; and
- postgraduate—level 7 graduate certificates and diplomas, level 8 postgraduate qualifications (including honours) and masters and doctorates.

Industry training numbers

The number of enrolments in industry training was obtained from the Tertiary Education Commission. Enrolments for each industry-training organisation from 2000 to 2007 were extracted by gender, age group and ethnic group. The Asian ethnic group was not included as this ethnic group is not reliably recorded in this data. Enrolment figures include Modern Apprentices.

The industry training data uses a prioritised method for recording ethnicity, and there was insufficient data available to disaggregate it. In a prioritised ethnic system a person who indicates they are Māori among their ethnic affiliations is deemed to be only Māori. The next group in the priority hierarchy is Pasifika and then European (and others). However, students enrolled in different industry training schemes are counted in each scheme. One effect of the ethnic prioritisation is to undercount Pasifika students.

The 2008 figures were estimated by extrapolating the time series one year out from 2007.

8.2 The basis of the modelling method

The participation rates were calculated using historical data for every combination of age group, level of study and gender, together with either sub-sector or ethnic group. The length of historical data available varies a little with the particular variable, but mostly data is available from 1994 to 2008.

Projected participation rates are then calculated using three scenarios (see section 8.3). Each scenario is characterised by the duration, direction and strength of change to participation rates (for each combination of age group and level of study), based on known and predicted factors likely to influence participation in tertiary education. The scenario's characteristics and historical changes in participation rates for a particular combination of variables are then used to calculate projected participation rates.

Then, using these projected participation rates, student numbers are calculated using population projections. The details of the method are available from the author.

8.3 Scenarios

Projections are calculated using three scenarios: *no-change*, *improving productivity* and *recession*. Within each scenario, for each combination of age group and level of study (including industry training), the direction and strength of the change in tertiary participation is postulated. An additional factor used in the models is the length of time over which participation rates are allowed to vary. Table 4 and Table 5 show the characteristics for the improving productivity and recession scenarios respectively.

The direction of change can be *up*, *down* or *flat*¹¹. The arrows in the tables indicate the direction of change.

The strength of change can be *none* (which corresponds to the ‘flat’ direction), *low*, *medium* or *high*. The corresponding changes to the participation rate are none, and the 25th, 50th and 75th percentile of the percentage change in historical participation rates respectively. In the tables below the angle and number of arrows indicate the strength of change.

The duration of change in the improving productivity and recession scenarios is set to the expected length of the current economic downturn (currently envisaged to be four years). The model can accommodate different durations of economic downturn, but is constant across scenarios in any one modelling run.

The population-driven scenario assumes a flat change in the direction of participation rates, which essentially keeps participation rates constant at or near 2008 levels. It provides an indication of changes in demand for tertiary education based solely on demographic changes.

The improving productivity scenario embodies the changes envisaged by the Statement of Tertiary Education Priorities 2008 to 2010 (Ministry of Education 2007a): a focus on 18-to-24-year-olds achieving educational success in higher-level qualifications; increasing trade, technical and professional qualifications in levels 4 to 6; and focusing on increasing literacy skills in levels 1 to 3 for people already in the workforce. The scenario postulates a positive behavioural response to these policies. The characteristics for industry trainees assume low levels of unemployment. The details are shown in Table 4. In this table and the next, blank cells indicate combinations of age group and level of study with very few students. In the model, the participation rates for these combinations are set to not change.

Table 4

Direction and strength of change in participation rates for the improving productivity scenario

Age	Level 1-3 certificates	Level 4 certificates and diplomas	Bachelor	Post-graduate	Over all levels of study	Industry training
<18	↓	↑			→	↗
18-19	↓	↑	↑		↗	↗
20-24	↓	↑	↑	↗	↗	↗
25-39	→	↗	↗	→	↗	↗
40-65	↗	↗	→	→	↗	↗

↑ ↓ represent a medium strength up or down movement.
 ↗ ↘ represent a low strength up or down movement.
 → represent no change.

¹¹ Under ‘flat’ conditions the actual rate of change is changed (up or down) by 1/4 and then by 1/8 over two successive years. This has a minimal effect on participation rates for most combinations of variables, but for those with relatively high rates of change this method guards against abrupt changes in trends.

The recession scenario assumes an economic downturn, with our assumptions of how this will affect the tertiary education sector (Table 5). The likely impact of higher unemployment levels also affects industry training.

Table 5
Direction and strength of change in participation rates for the recession scenario

Age	Level 1-3 certificates	Level 4 certificates and diplomas	Bachelor	Post-graduate	Over all levels of study	Industry training
<18	↑↑	↑↑			↑	↓↓↓
18-19	↑↑	↑↑	↗		↑	↓↓↓
20-24	↑↑	↑↑	↗	↗	↑	↓↓↓
25-39	↗	↗	↗	→	↗	↓
40-65	→	→	→	→	→	↘

↑↑ ↓↓↓ represent a high strength up or down movement.
 ↑ ↓ represent a medium strength up or down movement.
 ↗ ↘ represent a low strength up or down movement.
 → represents no change.

Directions and strengths of movement of participation rates are kept constant across sub-sectors for each level of study and age group combination. This is necessary to ensure model results including sub-sector are consistent with those excluding sub-sector. The column headed ‘over all levels of study’ provides directions and strengths of change in participation rates as an average over all levels of study. This is required because of the multiple response nature of the data, which precludes simply summing lower-level projections to produce sums for higher-level groupings.

8.4 Accuracy of the population projections

Statistics New Zealand suggest that the value of any set of population projections should be assessed on its relevance, timeliness, coherence, accessibility, interpretability and accuracy (Statistics New Zealand 2008a). Here we are concerned with their accuracy.

Statistics New Zealand (2008a) indicate that their demographic projections are neither predictions nor forecasts. They represent the statistical outcomes of various combinations of selected assumptions about future changes in the dynamics of population change. These assumptions are formulated from the latest demographic trends and patterns, as well as international experiences.

Statistics New Zealand (2008a, p. 1) also indicate that projections for larger geographic areas have smaller relative errors than those for smaller geographic areas. This is the primary reason it was decided not to provide regional breakdowns of tertiary demand, as was done in the Ministry of Education’s previous study of this kind (McClelland 2006). The other main factor influencing accuracy is the length of time from when the base population was actually counted.

The projections used in this study were based on the 2006 New Zealand census data. However, after two years, Statistics New Zealand indicated that the projections were already too low; the unexpected increase in births in New Zealand that began in 2002 had accelerated from 2006 onwards (Ministry of Education 2008a). Consequently, based on Statistics New Zealand advice, two series were blended to produce the final population projections (see section 8.1 for a detailed description of this blending). The uncertainty regarding birth rates across regions also contributed to a decision not to make a regional breakdown, as done by McClelland (2006).

Statistics New Zealand use a cohort component method to calculate projections. This method uses assumptions about deaths and migration within each age-sex group, acting on the base

population. Assumptions about fertility produce birth cohorts that add to the population size (Statistics New Zealand 2008a, p. 6). Ethnic group projections add further complexity (Statistics New Zealand 2008b), as the ethnicity of a person can change over time, trends in fertility, mortality and migration are more difficult to determine for ethnic groups, and people may identify with more than one ethnic group. Certainly, we regard the results for ethnic groups as less accurate, overall, than those based on the whole population.

A particular problem has been identified when using cohort component generated population projections in studies involving education (as in this study), which is that fertility will vary with educational attainment (Lutz & Goujon 2001). In particular, a more educated person is less likely to have a large family, meaning their birth rate will be lower. Multi-state population projection methodologies (Lutz & Goujon 2001; Lutz 2006) have been shown to provide better projections, but using these was beyond the scope of this study. Statistics New Zealand (2008a, p. 27) indicate that they are investigating using stochastic models to produce their projections, which will enable them to provide estimates of variability (in itself a useful improvement), but this won't overcome the problem of a changing birth rate when people's educational attainment changes.

While we recognise this problem, we have not attempted to re-calculate the population figures. We have assumed that changing fertility is inherently modelled in the birth rates of the different ethnic groups. This is not ideal, as it is likely that birth rates may be over-estimated for Māori and Pasifika groups, particularly in the longer term as more highly educated people in these ethnic groups start families themselves.

8.5 Accuracy of our results

How accurate are our results? Providing guidelines as to the accuracy of the forecasts and projections is difficult. The method used in this study to gauge the level of variability in the results was to produce projections for different scenarios. The three scenarios modelled alternative and contrasting outcomes, so they provide an indication of the possible upper and lower limits of demand. Where the three trajectories are the same or similar, the expectation is that changes population size will be the primary determinant of demand. On the other hand, where the three trajectories are dissimilar, the actual change in demand could fall anywhere in the range. Clearly the wider the range, the less certainty there is in the actual outcome. Future studies could be undertaken to determine how demand actually changed in the years 2009 to 2012, and how our assumptions matched up to that reality.

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MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga